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CHICAGO, ILL., U. S. A.

Learning and Labor.

LIBRARY

OF THE

University of Illinois.

CLASS

BOOK.

VOLUME.

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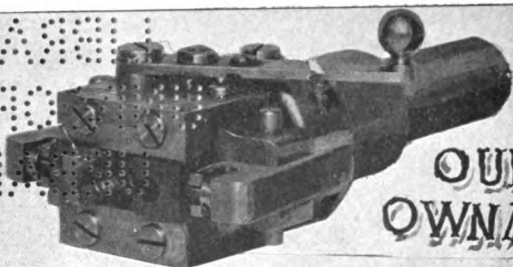
100
100

FINE TOOLS

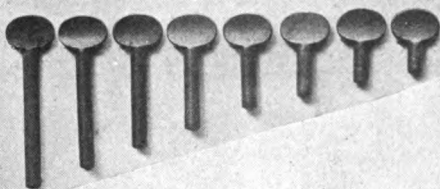
CHARLES H. BESLY & CO.

**MAKERS
DEALERS
IMPORTERS
10 & 12 N CANAL ST.
CHICAGO ILL. U.S.A.**

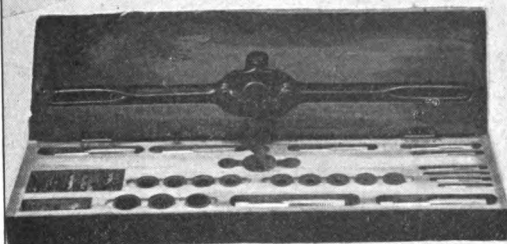




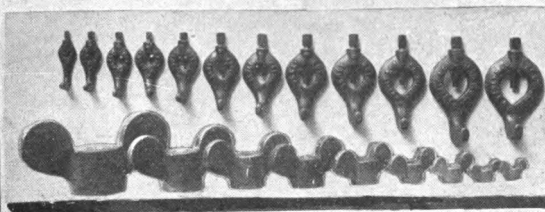
**OUR
OWN MAKE**



**MALLEABLE IRON
THUMB SCREW
BLANKS**



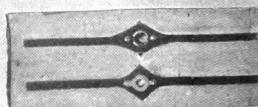
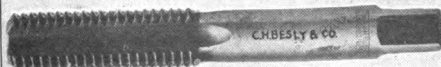
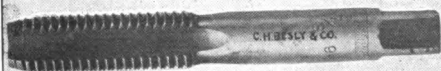
**GARDNER
DIE
STOCK**



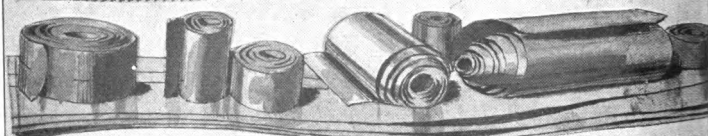
**BESLY
LATHE DOGS**

**MALLEABLE
IRON
THUMB NUT
BLANKS.**

WE MAKE TAPS.



BADGER DIE STOCK



HELMET BRONZE-SPRING

SHEET AND WIRE

"D" CATALOGUE

MAY, 1897

CHARLES H. BESLY & CO.

10 and 12 N. Canal St.
Bet. Randolph and Lake Sts.

CHICAGO, ILL., U. S. A.

Manufacturers' and Machinists' Hardware

BRASS AND COPPER

In Rolls, Sheets, Rods, Tubes, and Wire

FINE TOOLS

For Metal Workers

SEAMLESS TUBES

In Brass and Copper

Platers', Polishers' and Grinders' Supplies

✻ SUPPLIES ✻

For Machinists, Railroad Shops, Founders, Moulders, Agricultural Implement
Manufacturers, Pump Manufacturers, Gold, Silver, and Nickel Platers,
Amateurs, Grinders, Polishers, Inventors, Pattern Makers,
Draughtsmen, Engineers, Miners, Model Makers,
Gunsmiths, Locksmiths, Blacksmiths, Bicy-
cle Manufacturers, Electrical, Iron and
Steel Manufacturers, Saw Mill
Men, etc., etc.

BRASS WIRE CLOTH

SPECIAL ARTICLES FROM SHEET METAL MADE TO ORDER

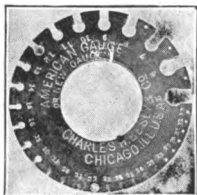
Any article in our line not in this Catalogue will be furnished
if it can be made or found in stock

COPYRIGHT, 1897, BY CHARLES H. BESLY & CO.

24938

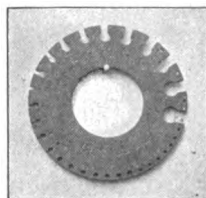
RULES FOR ORDERING.

The American Standard Wire Gauge
Adopted by the Brass Manufacturers
Jan., 1858.



Sometimes called Brown & Sharpe's
Gauge, New Gauge and N. G.

English Standard Wire Gauge.



Sometimes called Stubs' Gauge
or S. G.

The best way to order Metals is to give thickness in thousandths of an inch. Order Sheet Brass, Bronze and Platers' Metal, Phosphor Bronze, Electric and German Silver Wire, also **Brazed** and **Seamless** Brass Tubing and **all kinds of Wire** except Music Wire by American Standard or New Gauge.

For sizes (in decimals) of London Gauge and Music Wire Gauge, see tables at back of book.

Tubing is measured **outside**, unless otherwise stated. Parties ordering Metal or Wire will please make their orders to conform with above gauges. All orders where the name of gauge is not stated will be filled as above. In case parties ordering Metal or Wire do not have a gauge, a small piece of either material may be sent, which will answer for the gauge.

In ordering **Metal**, always state width and temper wanted. Sheet Brass and Brass Wire are made in soft, half-hard and spring. When ordering state which temper is desired. The term "High" Brass refers to color and not to temper. "High" Brass is yellow; "Low" Brass is red.

Please use terms as given in Catalogue, always using Catalogue number as well as name of article.

IMPORTANT.

TERMS CASH. We allow one-half of one per cent cash discount on all bills paid within ten days from date of same. All claims for corrections or deductions must be made within five days after receipt of goods.

Bank remittances must be made with Chicago or New York exchange. Give shipping directions, otherwise we will forward by mail, registered mail, express or freight, as we think will be most advantageous to customer. All goods after shipment at risk of purchaser. Our responsibility ceases when we obtain receipt from transportation company. Claims for breakage should be made direct to transportation company.

Boxing and cartage charged at cost.

Specify **Catalogue Figure** as well as name of article, and mistakes in ordering will be avoided. A letter of advice giving date and amount of invoice should accompany all returned goods, thus insuring prompt credits.

All contracts subject **to delays** from strikes, accidents, or causes beyond our control.

Current discount sheets will be issued, but **all quotations are subject to change without notice.** We are not responsible for errors in this catalogue.

C. O. D.

We will send goods C. O. D. only when enough money accompanies the order to pay transportation charges to destination and return.

MISTAKES.

We make them; you do; so does everyone. We will cheerfully correct them if you will write to us. Try to write us good-naturedly, but if you cannot, then write us anyway.

Do not let an error pass unnoticed. Complain to us first about it. We want the first opportunity to make right any mistakes.

CHARLES H. BESLY & CO.

For Weight
of Sheet
Brass see
Table Back
of Book.

ROLL AND SHEET BRASS.

COMMON HIGH BRASS.	Wider than and including	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.
		2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30	30 32	32 34	34 36	36 38	38 40	40
To No. 20, inclusive		.22	.23	.25	.27	.29	.31	.33	.36	.39	.42	.46	.50	.55	.60	.65	
Nos. 21, 22, 23 and 24		.22	.24	.26	.28	.30	.32	.34	.37	.40	.43	.47	.51	.56	.61	.68	
" 25 and 2623	.24 ¹ ₂	.27	.29	.31	.33	.35	.38	.41	.44	.48	.52	.57	.63	.71	
" 27 and 3823	.25	.28	.30	.32	.34	.36	.39	.42	.45	.49	.53	.58	.65	.75	
																Sp. 1 price not less than 80c.	

Patent Leveled Engraver's Sign Brass, price on application.

PLATERS' METAL.

Brass,	\$0.72	\$0.72	\$0.77	\$0.83	\$0.90 per lb.
Bronze,	.84	.84	.89	.95	1.02 "

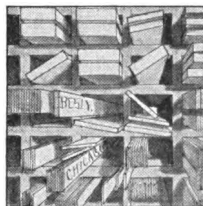
SLITTING METAL.

Drawn Strips, 4c. above price Slit Brass. (Drawn Strips are all metal drawn in dies, thinner than No. 8, B. & S. gauge; No. 8, B. & S. and thicker, listed and sold as rectangular rod.)

SAWED METAL.

Sawed Metal cut to particular lengths, add to the above:

9c. 10c. 12c.



All Metal heavier than No. 6, B. & S. gauge, listed and charged as sawed metal, whether slit or sawed.

D 5. JEWELERS' OR GOLD METAL.

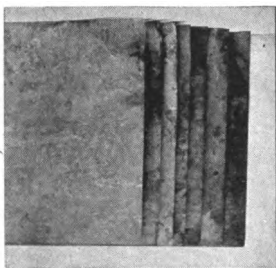
D 6. **HIGH BRASS CIRCLES**—Not thinner than No. 20.

BRASS PAIL EARS, 50 cts. per lb.; WROUGHT BRASS DOOR RAIL, polished, 35 cts. per lb., list.

D 8. PRINTERS' 2x4 SHEETS AND GALLEY SHEETS.

22 lb., No. 14, B. & S. gauge and thicker.....	Per Lb
21 " " 15, " " to 15 lb., No. 18, B. & S. gauge, both inclusive.....	\$0.32
14 " " 19, " " to 12 " 20, " " " ".....	.34
11 " " 21, " " to 9 " 22, " " " ".....	.40
8 " " 23, " " to 7 " 24, " " " ".....	.48
Thinner than 7 lb., No. 24, B. & S. gauge.....	.56
High Brass Screen Plates.....	.70
	To Order.

SHEET COPPER.

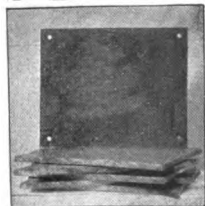


	Per Lb.
Braziers' ordinary sizes, 16 oz. and over...	30c.
Locomotive Fire Box Sheets.....	30c.
Braziers' ordinary sizes, under 16 oz. and over 12 oz. per sq. ft.....	32c.
All Sheets, 10 and 12 oz. per sq. ft.....	34c.
All Sheets under 10 oz.....	36c.
Circles less than 84 inches diameter.....	33c.
Circles 84 inches diameter and over.....	36c.
Segment and irregular Pattern Sheets....	33c.
Sheathing (sheets 14x48), over 12 oz. and not over 34 oz.....	28c.
Bolt Copper.....	30c.

When we cut sheets we charge 40 cts. per lb.

TINNING.

ELECTRIC COPPER, 10 in. wide, Nos. 33 and 36, B. & S. Gauge, per lb..	75c.
SPRING COPPER, for Electric Machines, per lb.....	75c.



D 10. COPPER PLATES OR ANODES

Half Spring Sheet Copper for printers' spaces.
Brush Copper, all gauges, special composition.



Sheet German Silver from 20 to 30 Gauge in stock.

Prices are for 100 lbs. or more of German Silver in one order.

D 11.

GERMAN SILVER.

IN SHEETS AND ROLLS. BROWN & SHARPE'S GAUGE THE STANDARD.

2 in. to 8 in., inclusive, to No. 20.

Per Ct.	Per Lb.	Per Ct.	Per Lb.	Per Ct.	Per Lb.	Per Ct.	Per Lb.
4.....	\$0.40	8.....	\$0.46	12.....	\$0.52	16.....	\$0.58
5.....	.41	9.....	.47	13.....	.53	17.....	.59
6.....	.42	10.....	.48	14.....	.54	18.....	.60
7.....	.43	11.....	.49	15.....	.55	20.....	.65

Advance 2 cents per pound for each additional inch in width above 8 inches, and 1 cent per pound for each number thinner than Nos. 20 to 30, inclusive, and 2 cents per pound per number thinner than Nos. 30 to 36, inclusive.

German Silver thinner than No. 36 is "Platers," as follows :

No. 40, .003	1 0, .0025	2 0, .002	3 0, .0015	4 0, .001
\$1.62	\$1.80	\$1.98	\$2.25	\$2.52

German Silver cut to particular lengths, add to list 15 cents per pound.

Slitting German Silver, the same price as for Slitting Brass.

Sawed German Silver in Bars, Plates or Ingots, 20 cents per pound more than the List.

German Silver Scrap, one-half the net price of List for 8 inch Sheet Metal at No. 20. Turnings, Filings, etc., one-half the price of Scrap.

Sheet Zinc, Market Rates.

HELMET BRONZE SPRING

IN SHEETS AND ROLLS,

Making Remarkably Stiff Springs for all

MECHANICAL PURPOSES.



HELMET BRONZE SPRING SHEET.

B. & S. GAUGE SAME AS NEW GAUGE.



D 12.

Price per lb.		Price per lb.	
No. 1 to 20	\$0.35	No. 29	\$0.47
" 21	.36	" 30	.49
" 22	.37	" 31	.51
" 23	.38	" 32	.53
" 24	.39	" 33	.55
" 25	.40	" 34	.57
" 26	.41	" 35	.59
" 27	.43	" 36	.61
" 28	.45		

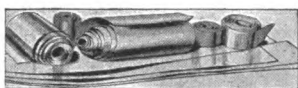
We have in stock in Chicago all Nos. HELMET SPRING SHEET BRONZE from 12, New Gauge, to 36, New Gauge, in long rolls, 6 in. wide, and can cut to any length.

D 13.

DRAWN ZINC RODS.

FOR BATTERY AND OTHER PURPOSES.

From Finest Grades of Spelter. Round, Square, etc. In long lengths or cut to length.



D 14. ROLL AND SHEET PHOSPHOR-BRONZE.

BROWN & SHARPE'S GAUGE THE STANDARD.

Metal 6 inches wide only carried in stock.

Width over to	2 6	6 8	8 10	10 12	12 14	14 16	16 18	18 20	20 22	In. "	Cts.
No. 1 to 20	48	50	52	54	56	58	60	62	64	...	...
" 21	49	51	53	55	57	59	61	63	64	...	...
" 22	50	52	54	56	58	60	62	64	64	...	...
" 23	51	53	55	57	59	61	63	64	64	...	...
" 24	52	54	56	58	60	62	64	64	64	...	...
" 25	53	55	57	59	61	63	64	64	64	...	...
" 26	54	56	58	60	62	64	64	64	64	...	...
" 27	56	58	60	62	64	64	64	64	64	...	...
" 28	58	60	62	64	64	64	64	64	64	...	...
" 29	60	62	64	64	64	64	64	64	64	...	...
" 30	62	64	64	64	64	64	64	64	64	...	...
" 31	64	64	64	64	64	64	64	64	64	...	...
" 32	66	64	64	64	64	64	64	64	64	...	...
" 33	68	64	64	64	64	64	64	64	64	...	...
" 34	70	64	64	64	64	64	64	64	64	...	...
" 35	72	64	64	64	64	64	64	64	64	...	...
" 36	75	64	64	64	64	64	64	64	64	...	...
" 37	100	64	64	64	64	64	64	64	64	...	...
" 38	125	64	64	64	64	64	64	64	64	...	...

For Slitting Metal, to widths varying by 1-16 inch, add to list as follows :

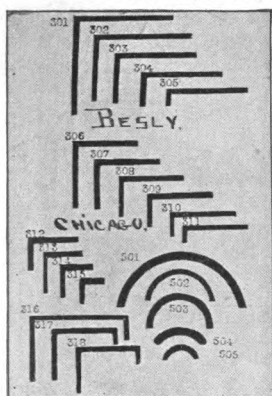
Nos.	Over ½ to 2 in.	Over ¼ to ½ in.	¼ inch and Nar- rower.
12-20	2c per lb.	4 cts.	Not less than 8c.
21-26	3c "	6 "	" 10c.
27-30	4c "	8 "	" 12c.
31-32	5c "	10 "	" 15c.
33	6c "	12 "	" 18c.
34	7c "	14 "	" 21c.
35	8c "	16 "	" 24c.
36	9c "	18 "	" 27c.

Sheets and lengths cut to particular sizes and lengths, and sheets not included in above list.....Special Prices.

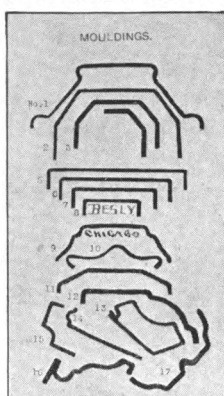
Slit Metal, cut to particular lengths, not less than 12 inches...add 5 cts. per lb.

Drawn Strips not thinner than No. 16, 10 cents per pound above Slit Metal.

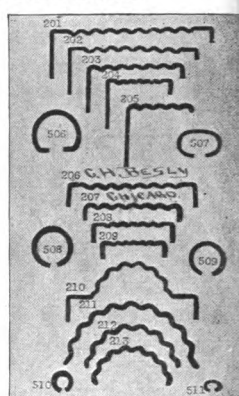
BRASS DRAWN WORK AND MOULDINGS.



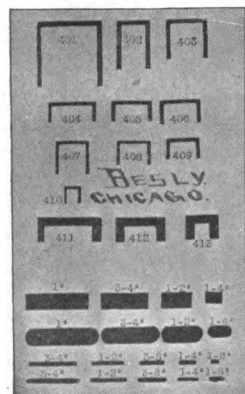
D 15.



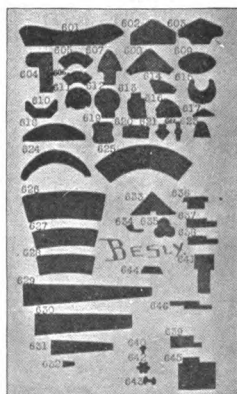
D 16.



D 17.



D 18.



D 19.

B. & S. GAUGE STAN'D.
Per Lb.
Half Round to No. 19,
inclusive.....35c
All other shapes, not
less than.....45c
Bronze Moulding, **7c.**
extra on List.

Thinner than No. 19,
same addition as for
Brass Tubing.

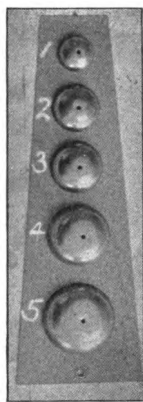
Angle and Channel Brass
to be listed and sold
as half-round mould-
ing.

High Brass Door Rail,
1 inch and wider,
No. 18 B. & S.
gauge and heavier,
polished or unpol-
ished36c

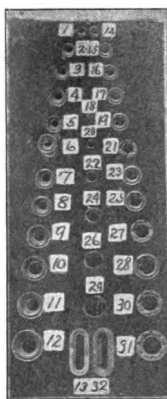
All kinds of Brass Drawn Work our specialty. Prices upon application.



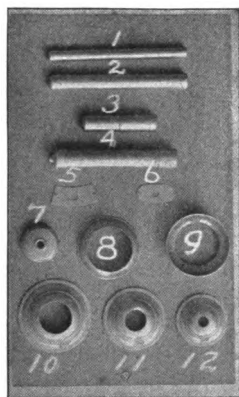
D 20.



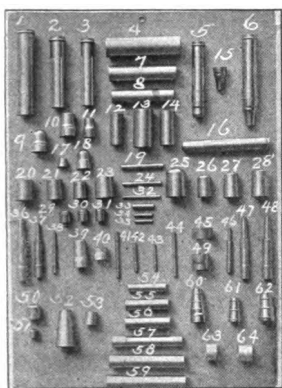
D 21.



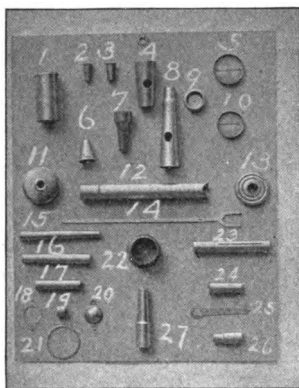
D 22.



D 23.



D 24.

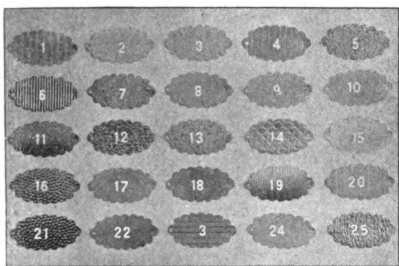


D 25.

Accompanying cuts represent a few designs of the special spun and drawn shapes carried at mill.

Special brass spun work in any style made to order.

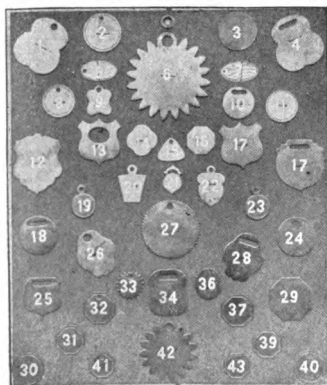
Prices on application.



D 26. FANCY SHEET BRASS.

In Rolls and Sheets.

This cut represent designs carried by us in stock at mill. Special designs made to order, and prices quoted upon application.



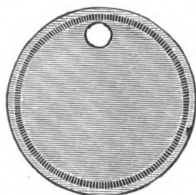
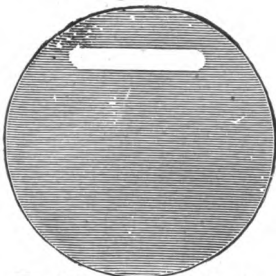
D 27. BRASS AND GERMAN SILVER CHECKS.

1-7th Actual Size.—Nos. 1, 4, 6, 9, 12, 13, 17, 20, 21, 22, 26, 27, 28, 33, 36, 42.....per lb., 90c.

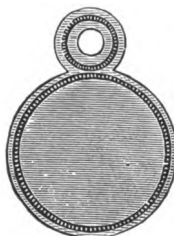
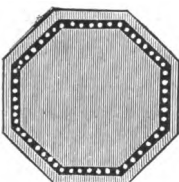
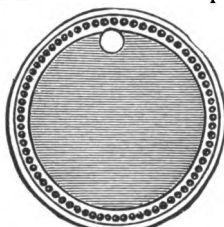
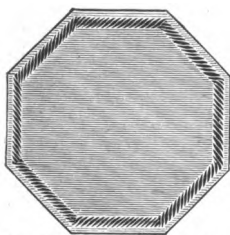
Nos. 2, 3, 8, 10, 19, 23, 24, 25, 29, 30, 31, 32, 34, 37, 39, 40, 41, 43.....per lb., 75c.

GERMAN SILVER.

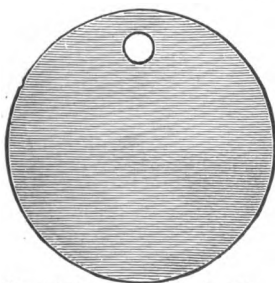
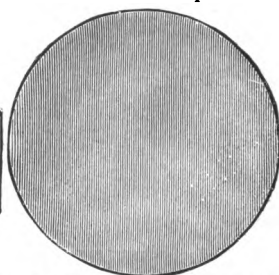
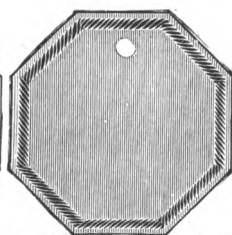
Per Lb.
Nos. 11, 14, 15, 16, 20, 21, 22 \$1.60

D 28. BRASS AND GERMAN SILVER CHECKS.**Full Size Cuts.**No. 0, Brass.
125 to the pound.No. 1, Brass.
120 to the pound.No. 2, Brass.
120 to the pound.

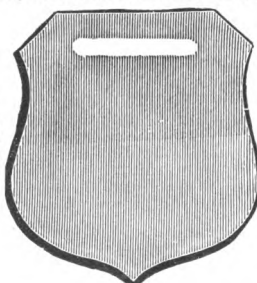
No. 3, Brass. 60 to the lb.

No. 4, Brass.
105 to the pound.No. 5, Brass.
105 to the pound.No. 6, Brass.
110 to the pound.No. 7, Brass.
105 to the pound.No. 8, Brass.
100 to the pound.

No. 9, Brass. 90 to the lb. No. 10, Brass. 86 to the lb. No. 11, Brass. 48 to the lb.



No. 12, Brass. 50 to the lb.



No. 16, Brass. 61 to the lb.

D 28.

Nos. 0, 1, 2, 3, 4, 5, 6,
7, 8, 9, 10, 11, 12, 16
Brass Checks, per
lb., 75 cents.

Nos. 0, 1, 2, 6 Ger-
man Silver Checks,
per lb., \$1.60.



Prices are for 100 lbs. or more of Wire in Coils in one order.

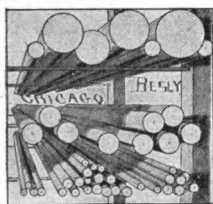
D 29. BRASS WIRE IN COILS.

STUBS' GAUGE THE STANDARD.

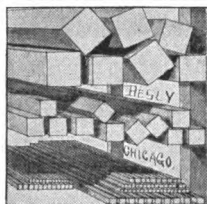
	Old English or London.	Brown & Sharpe's.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10, inclusive	.134	.10189	\$0.23	\$0.21	\$0.28
Above No. 10 to No. 16.....	.065	.05082	.23 $\frac{1}{2}$	.27 $\frac{1}{2}$	.28 $\frac{1}{2}$
Nos. 17 and 18.....	.049	.04030	.24	.28	.32
" 19 and 20.....	.035	.03196	.25	.29	.33
No. 21.....	.0315	.02846	.26	.30	.34
" 22.....	.0295	.025347	.27	.31	.35
" 23.....	.027	.022571	.28	.32	.36
" 24.....	.025	.0201	.30	.34	.38
" 25.....	.023	.0179	.32	.36	.40
" 26.....	.0205	.01594	.35	.39	.43
" 27.....	.01875	.014195	.38	.42	.46
" 28.....	.0165	.012641	.42	.46	.51
" 29.....	.0155	.011257	.45	.49	.54
" 30.....	.01375	.010025	.48	.52	.62
" 31.....	.01225	.008928	.51	.55	.67
" 32.....	.01125	.00795	.55	.59	.73
" 33.....	.01025	.00708	.59	.63	.82
" 34.....	.0095	.0063	.64	.68	.95
" 35.....	.009	.00561	.70	.74	1.30
" 36.....	.0075	.005	.76	.80	1.50
" 37.....	.0065	.00445	1.00	1.04	1.70
" 38.....	.00575	.003965	1.30	1.34	2.00
" 39.....	.005	.003531	2.00	2.00	3.25
" 40.....	.0045	.003144	2.60	2.60	5.75

Spring Wire, 2 cents per lb. advance. Whitened Wire, 3 cents per lb. advance. Flat, Square and Half Round Wire, 4 cents advance on Round Wire, gauged the thin way after finishing. To determine the price of Flat Wire, add to price of wire measured the smallest way. Fancy Wire, not less than 10 cents advance on Round Wire. Wire straightened and cut, No. 12 and smaller, 12 cents per pound additional. Same additions for cutting to length when under 2 feet as rods.

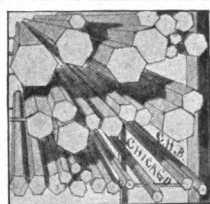
D 30. SPOOLING WIRE. { On 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 pound spools.
At 12, 11, 10, 9, 8, 7, 6, 5, 4, 3 cents per lb.
Less than 1 pound spools, 24 cents per pound.



D 31.



D 32.



D 33.

HIGH BRASS RODS.—Stubs' Gauge the Standard.

Not Less than Two Feet Lengths.

$\frac{1}{4}$ inch to 1 inch diameter, both inclusive.....	24c. per lb.
No. 8, and less than $\frac{1}{4}$ inch diameter.....	26c. "
Over 1 inch diameter.....	27c. "
Smaller than No. 8 to No. 11, inclusive.....	30c. "

Hexagon, Octagon and Square, 2 cents per pound advance over Round Rods. Rectangular, Half-Round and fancy shapes, not less than 4 cents advance over Round Rods. (Rectangular Rod is measured the thinner way.)

Rods less than 2 feet lengths, add to above prices for cutting.

12 to 24 in.	9 to 12 in.	6 to 9 in.	4 to 6 in.	2 to 4 in.	1 to 2 in.
2c.	3c.	4c.	5c.	8c.	12c.

Shorter than 1 inch, special.

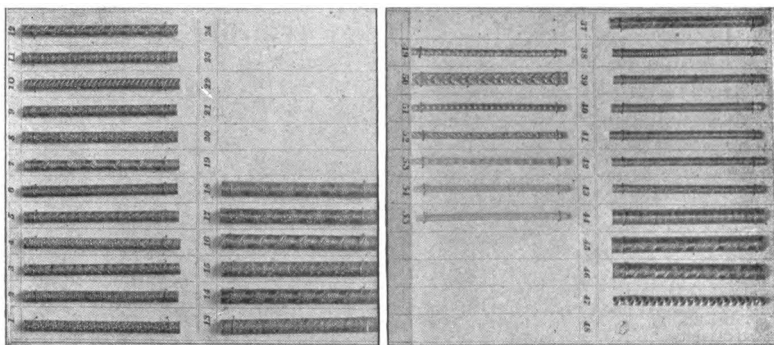
Add to above for Gilding and Bronze Rods, 8c. per lb.; Low Brass Rods, 4c.

Smaller than No. 11, see Wire List.

Copper Rods—cut lengths, 25c. per lb.; full lengths, market rates.

D 34.

FANCY BRASS RODS.



Above cuts represent designs carried in stock at mill. Special designs made to order upon application. Write for prices.



CHARLES H. BESLY & CO.

SOLE MANUFACTURERS

D 35. HELMET BRONZE SPRING WIRE.

STUBS' GAUGE SAME AS ENGLISH GAUGE.

	Price per lb.
No. 1 to 16.....	\$0.35
" 17 to 18.....	.36
" 19 to 20.....	.37
" 21.....	.38
" 22.....	.39
" 23.....	.41
" 24.....	.43

	Price per lb.
No. 25.....	\$0.45
" 26.....	.47
" 27.....	.49
" 28.....	.53
" 29.....	.57
" 30.....	.61

We have in stock in Chicago HELMET BRONZE SPRING WIRE; all Nos. from 00 S. G. to 30 S. G.

Coils weigh about 25 pounds each.



D 36.

PHOSPHOR-BRONZE WIRE IN COILS.

BROWN & SHARPE'S GAUGE THE STANDARD.

Brown & Sharpe's, or American.			Stubs' or Birmingham.			Old English, or London.		
Gauge.								
No.	Diameter.	Price.	No.	Diam.	Price.	No.	Diameter.	Price.
To 16...	.050820	\$0.50	16	.065	\$0.50	16	.065	\$0.50
17...	.045257	.51	17	.058	.50	17	.058	.50
18...	.040303	.51	18	.049	.50	18	.049	.50
19...	.035890	.52	19	.042	.51	19	.040	.51
20...	.031961	.52	20	.035	.52	20	.035	.52
21...	.028462	.54	21	.032	.52	21	.0315	.52
22...	.025347	.56	22	.028	.54	22	.0295	.54
23...	.022571	.58	23	.025	.56	23	.027	.55
24...	.020100	.60	24	.022	.58	24	.025	.56
25...	.017900	.64	25	.020	.60	25	.023	.58
26...	.015940	.68	26	.018	.64	26	.0205	.60
27...	.014195	.74	27	.016	.68	27	.01875	.64
28...	.012641	.80	28	.014	.74	28	.0165	.68
29...	.011257	.90	29	.013	.78	29	.0155	.70
30...	.010025	1.00	30	.012	.84	30	.01375	.74
31...	.008928	1.25	31	.010	1.00	31	.01225	.84
32...	.007950	1.50	32	.009	1.25	32	.01125	.90
33...	.007080	1.75	33	.008	1.50	33	.01025	1.00
34...	.006304	2.00	34	.007	1.75	34	.0095	1.15
35...	.005614	2.50				35	.009	1.25
36...	.005000	4.25				36	.0075	1.50

Prices are for 100 lbs. or more of German Silver Wire in one Order.

D 37. GERMAN SILVER WIRE.—B. & S. Gauge the Standard.

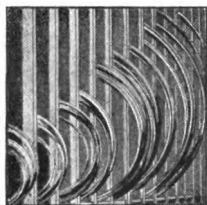
	No. 16.	Nos. 17 & 18	Nos. 19 & 20	No. 21.	No. 22.	No. 23.	No. 24.	No. 25.	No. 26.
4 pr. ct. to and inc.	\$0.53	\$0.55	\$0.58	\$0.60	\$0.62	\$0.65	\$0.67	\$0.70	\$0.72
5 " " "	.54	.56	.59	.61	.64	.66	.69	.71	.73
6 " " "	.55	.58	.60	.62	.65	.67	.70	.72	.74
7 " " "	.56	.59	.61	.64	.66	.68	.71	.73	.76
8 " " "	.58	.60	.62	.65	.67	.70	.72	.74	.77
9 " " "	.59	.61	.64	.66	.68	.71	.73	.76	.78
10 " " "	.60	.62	.65	.67	.70	.72	.74	.77	.79
11 " " "	.61	.64	.66	.68	.71	.73	.76	.78	.80
12 " " "	.64	.66	.68	.71	.72	.76	.78	.80	.83
13 " " "	.66	.68	.71	.73	.76	.78	.80	.83	.85
14 " " "	.68	.71	.73	.76	.78	.80	.83	.85	.88
15 " " "	.71	.73	.76	.78	.80	.83	.85	.88	.90
16 " " "	.72	.76	.78	.82	.84	.89	.92	.96	1.00
17 " " "	.76	.78	.80	.84	.88	.92	.96	1.01	1.06
18 " " "	.78	.80	.83	.95	.98	1.03	1.08	1.08	1.14
20 " " "	.90	.96	1.03	1.08	1.13	1.18	1.24	1.30	1.54
25 " " "	1.20	1.28	1.33	1.36	1.38	1.42	1.50	1.62	1.75
30 " " "	1.54	1.56	1.63	1.68	1.74	1.81	1.93	2.05	2.16

18 PER CT. GERMAN SILVER RESISTANCE WIRE.—B. & S. Gauge.

Nos.	20	21	22	23	24	25	26	27	28	29
Per lb.	\$0.83	\$0.95	\$0.98	\$1.03	\$1.08	\$1.08	\$1.14	\$1.25	\$1.40	\$1.55
Nos.	30	31	32	33	34	35	36	37	38	
Per lb.	\$1.75	\$1.95	\$2.35	\$2.60	\$2.95	\$3.65	\$6.50	\$11.50	\$18.00	

Flat, Square and Half-Round Wire, eight cents per pound more than Round.
 All Fancy Wires, not less than fifteen cents more than Round Wire.
 German Silver Wire, straightened and cut to lengths, same additions as for Brass Wire.
 German Silver Wire, No. 4 and thicker, same price as German Silver Rods.
 German Silver Rods, fifty per cent. more than wire. Same additions for cutting to length under two feet as Brass Rods.
 All wire between gauges takes price of next smaller gauge.

D 38. SPOOLING WIRE.—Same as Brass, See D 30.



D 35. BESSEMER STEEL SPRING WIRE.

IN 100 POUND BUNDLES.

Nos.	0000 to 2	3 to 9	10 & 11	12	13 & 14
Cts. per lb.	10	10	11	11½	12½
Nos.	15 & 16	17	18	19	20
Cts. per lb.	14	15	16	19	20

Five cents per pound extra, when we break bundles.



D 39. BESSEMER STEEL RODS.

IN FOUR-FOOT LENGTHS.

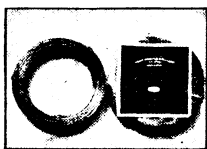
	Each.	Per lb.		Each.	Per lb.
1-2 inch. ....	.55	\$0.15	No. 7.	\$0.09	\$0.20
7-16 " " " " .	.45	.15	" 8. ....	.07	.20
3-8 " " " " .	.30	.15	" 9. ....	.06	.20
5-16 " " " " .	.20	.15	" 10. ....	.05	.20
1-4 " " " " .	.15	.15	" 11. ....	.05	.20
3-16 " " " " .	.10	.15	" 12. ....	.05	.25
5-32 " " " " .	.10	.15	" 13. ....	.05	.25
1-8 " " " " .	.05	.15	" 14. ....	.05	.25
No. 1. ....	.18	.15	" 15. ....	.05	.25
" 2. ....	.15	.15	" 16. ....	.05	.30
" 3. ....	.13	.15	" 17. ....	.05	.30
" 4. ....	.12	.15	" 18. ....	.05	.30
" 5. ....	.11	.15	" 19. ....	.05	.30
" 6. ....	.10	.20	" 20. ....	.05	.30
1 inch.	\$1.60	\$0.15			
7-8 " " " " .	1.25	.15			
3-4 " " " " .	.90	.15			
5-8 " " " " .	.65	.15			
9-16 " " " " .	.60	.15			

Try our Brush Copper for Electrical Work.

C. H. BESLEY & CO.

SPECIAL BRAND STEEL PIANO WIRE.

FOR SPIRAL SPRINGS.



D 40.

This wire is made by a peculiar process, which renders it very tough and springy. It does not require to be tempered, as it has a perfect spring temper, and is ready for use as soon as it is wound. It comes in $\frac{1}{2}$ -lb. hanks and 1-lb. hanks. All sizes kept in stock from No. 0 to No. 35.

Number	00	0	1	2	3	4	5	6	7 to 9	10 to 40
Price per lb.,	\$8.00	\$6.35	\$5.00	\$4.40	\$3.75	\$3.15	\$2.20	\$1.75	\$1.10	\$1.00
No. 7, 1-64 in. dia.; No. 13, 1-32 in. dia.; No. 21, 3-64 in. dia.; No. 26 1-16 in. dia.										

STUBS'
POLISHED ROUND
STEEL WIRE.



D 41.

In one-foot and three-foot lengths.			Sizes by Stubs' Steel Wire Gauge.		
Nos.	1 to 2	\$0.15 per ft.	Nos.	5 to Z	\$0.95 per lb.
"	3 to 7	.14 "	"	6 to 15	1.10 "
"	8 to 15	.13 "	"	16 to 30	1.25 "
"	16 to 19	.12 "	"	31 to 38	1.35 "
"	20 to 25	.11 "	"	39 to 46	1.55 "
"	26 to 30	.10 "	"	47 to 50	1.80 "
"	31 to 35	.09 "	"	51 to 54	2.10 "
"	36 to 40	.08 "	"	55 to 57	2.60 "
"	41 to 50	.07 "	"	58 to 60	3.00 "
"	51 to 60	.06 "	"	61 to 62	3.40 "
"	61 to 70	.05 "	"	63 to 65	3.90 "
"	71 to 80	.05 "	"	66 to 68	4.30 "
			"	69 to 70	4.70 "

LIST OF WIRE.

D 42.

MARKET WIRE.

Nos.....	0000 to 9	10 & 11	12	13 & 14	15 & 16	17	18
Cts. per lb..	10	11	11½	12½	14	15	16

D 43.

ANNEALED STONE OR WEAVING WIRE.

Nos.....	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Cts. per lb..	14	15	16	19	20	21	22	23	24	25	26	28	29	30	32	33
Nos.....	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
Cts. per lb..	35	37	40	45	55	40	45	50	55	60	65	75	85	100	115	140

D 44.

TINNED WIRE.

Nos.....	0 to 9	10 & 11	12 to 14	15 & 16	17	18
Cts. per lb..	15	16	17	17½	18	18½

D 45.

TINNED STONE WIRE.

Nos.....	18	19 & 20	21 & 22	23 & 24	25	26	27	28	29	30	31	32	33	34	35	36
Cts. per lb.	18½	19	20	21	22	23	24	25	26	27	28	32	33	34	40	48

D 46.

GUN SCREW WIRE.

Finished with great care as regards roundness and exactness to gauge.

Nos.....	00000 to 9	10 & 11	12 to 14	15 & 16	17	18
Cts. per lb..	16	17	18	19	20	21

D 47.

MACHINERY WIRE.

Nos.....	00000 to 9	10 & 11	12 to 14	15 & 16	17	18
Cts. per lb..	15	16	17	18	19	20

D 48.

CAST STEEL WIRE.

Nos.....	½ in. to 6	7 to 9	10 & 11	12	13	14	15	16	17	18	19	20
Cts. per lb..	23	24	25	26	28	30	32	33	34	36	38	40

D 49.

DRILL AND NEEDLE STEEL WIRE.

Nos.....	12 to 14	15 & 16	17	18	19	20	21	22	23	24	25
Cts. per lb..	55	60	65	70	75	80	85	90	100	110	120

D 50.

STRAIGHTENING AND CUTTING WIRE.

Nos.....	00000 to 5	6 to 9	10 & 11	12 to 16	17 to 20
Cts. per lb..	1	2	3	4	5

We Solicit Your Orders for Sheet Brass Cut to Special Size.



Subject to Change without Notice.

Prices are for 100 lbs. or more.

D 51. SEAMLESS BRASS TUBING.

OLD ENGLISH GAUGE STANDARD.

OUTSIDE DIAMETER.

FEB. 1, 1897.

PRICE LIST IN CENTS PER POUND.

O. G.	N. G.	1 ^a / ₈	3 ^a / ₁₆	1 ^a / ₄	5 ^a / ₁₆	3 ^a / ₈	7 ^a / ₁₆	1 ^a / ₂	5 ^a / ₈	3 ^a / ₄	7 ^a / ₈	1	1 1 ^a / ₈	1 1 ^a / ₄	2	2 1 ^a / ₄	2 1 ^a / ₂	2 3 ^a / ₄	3	3 1 ^a / ₄	3 1 ^a / ₂	3 3 ^a / ₄	4	4 1 ^a / ₄	4 1 ^a / ₂	4 3 ^a / ₄	5	5 1 ^a / ₄	5 1 ^a / ₂	5 3 ^a / ₄	6	6 1 ^a / ₄	6 1 ^a / ₂	6 3 ^a / ₄	7	7 1 ^a / ₄	7 1 ^a / ₂	7 3 ^a / ₄				
4	3	}	28	26	25	24	23	22	20	19	18	17	17	17	17	17	17	17	17	17	18	18	19	20	21	22	23	24	25	26	27	28	29	30	32	34	
11	9			
12	10		
13	11
14	12
15	13
16	14
17	15
18	16	76	56	41	37	34	31	30	29	27	26	25	23	22	22	22	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	42	44	46	48		
19	17	81	57	42	38	35	32	31	30	29	28	27	25	24	23	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	44	46	48	50		
20	18	86	59	44	39	36	34	33	32	31	30	29	27	26	25	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	48	50			
21	20	91	61	46	41	38	36	35	34	33	32	31	30	29	27	27	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	48	50	52				
22	21	96	66	51	43	39	37	36	35	34	33	32	31	29	29	30	31	31	32	33	34	35	36	37	38		
23	22	101	71	56	45	41	39	38	37	36	35	34	34	34	32	32	33	34	34	35	36	37	38	39		
24	23	111	76	61	48	43	41	40	39	38	36	35	35	36	36	37	37		
25	24	126	81	66	51	46	44	42	41	40	39	38	39	40		

NOTE.—For diameters of the fractional parts of an inch where no price is given, take the column to the left of where such size would appear if designated. Thus: 1 15-16 would go at price of 1 3-4 inches; 1 1-8 at the price of 1 inch; 5 1-8 inch at the price of 5 inches. No. 20 O. G. 1 inch is 29 cents; No. 20 O. G. 1 1-4 inch is 27 cents; No. 20 O. G. 1 1-8 inch would be 29 cents and not 27 cents. Make no price that does not appear on list.

COPPER BRONZE AND GILDING TUBE, 3 CENTS PER LB. ADDITIONAL.

Add 5 cents per pound to above list for Tubes 1-4 inch thick or thicker.

D 52. PRICES—IRON PIPE SIZES—BRASS.

1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	inch.
31	27	24	22	16	16	16	16	16	16	16	18	18	20	22	26	cts. per lb.

Copper, Bronze or Gilding Tubes, 3 cents per lb. additional.

For cutting Pump Chambers, Whistle Bells, Cylinders, and all Tubing cut to short lengths, as follows:

Tubing cut over 1 to 2 feet.....inclusive, 1	ct. extra advance on list.
" " 9 in. and up to 12 in.,	" 1 1/2 "
" " 6 "	" 9 "
" " 4 "	" 6 "
" " 2 "	" 4 "
" " 1 "	" 3 "
" " 3/4 "	" 1 "

Brass Condenser Tubes 5/8 inch to 1 inch, both inclusive, 21 cents per pound. No charge for tinning.

Copper Condenser Tubes 5/8 inch to 1 inch, both inclusive, 24 cents per pound. No charge for tinning.

Condenser Tubes thinner than No. 18, Stubs' Gauge, 2 cents per pound additional for each number.

Tinning Tubes other than Condenser Tubes, of sizes above specified, 3 cents per pound extra.

All Seamless Tubes of any shape other than Round shall be charged at an advance of not less than 5 cents per pound above price of regular round tubes of corresponding size.

TERMS: Net Cash 30 days without discount. Interest added at 6 per cent. after 30 days.

Cut lengths Seamless Brass Tubing double above list.

Try our Brush
Copper for
Electrical
Work.

Prices are for 100 lbs. or more of Brazed Brass Tubing in one order.

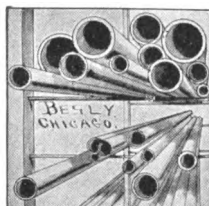
D 53, 54, 55.

BRAZED BRASS TUBING.

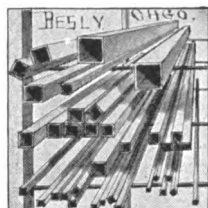
BROWN & SHARPE'S GAUGE THE STANDARD.



D 53.



D 54.



D 55.

						Per Lb.
Plain Round Tube,	$\frac{3}{4}$ in. up to 2 in.,	to No. 19, inclusive				\$0.35
"	"	$\frac{5}{8}$ " " " " " "	"	19, " "		.36
"	"	$\frac{1}{2}$ " " " " " "	"	19, " "		.38
"	"	$\frac{3}{8}$ " " " " " "	"	19, " "		.41
"	"	5-16 " " " " " "	"	19, " "		.48
"	"	$\frac{1}{4}$ " " " " " "	"	19, " "		.65
"	"	3-16 " " " " " "	"	19, " "		1.00
"	"	$\frac{1}{8}$ " " " " " "	"	19, " "		1.50
Smaller than $\frac{1}{8}$ inch						Special
2 inch to 3 inch, to No. 19, inclusive						\$0.38
3 inch						.40
Over 3 inch to $3\frac{1}{2}$ inch						.45
Over $3\frac{1}{2}$ inch						.50

Bronze and Copper, advance on Brass List, 3 cents.

For No. 20, add 2 cents extra.

For No. 24, add 12 cents extra.

" 21, " 4 " "

" 25, " 16 " "

" 22, " 6 " "

" 26, " 20 " "

" 23, " 8 " "

Thinner than No. 26, Special.

All Mandrel-drawn Tubes, $\frac{3}{8}$ inch and over, advance on above	.05
All Mandrel-drawn Tubes, under $\frac{3}{8}$ inch, advance on above	.25
Square and Fancy Tubes, advance on above	.08
Extra Fancy Patterns, advance on above	.16
Open Seam Tubes, 4 cents less than above prices of corresponding diameter and thickness.	

Tubing cut	12 in. to 24 in.	6 in. to 12 in.	4 in. to 6 in.	2 in. to 4 in.	1 in. to 2 in.
	1c.	2c.	3c.	4c.	6c. per lb.

Shorter than 1 inch, special. Combination Tubing, 60 cents.

For price on Rectangular Brazed Tubing, take diameter from shortest side and charge accordingly.

Prices for 100 lbs. or more of Zinc Tubing in one order.

D 56.

ZINC TUBING.

Per Lb.

Plain, No. 19, inclusive	\$0.32
Fancy, " "	.38
Scotch and Extra Patterns	.40
For Open Seam Tubing, 4 cents less than above, for corresponding size and numbers.	
Add the Brass Tubing List advance for numbers, sizes and cutting to length.	

D 57.

GERMAN SILVER TUBING.

	Per Lb.		Per Lb.
4 per cent. to No. 19, inclusive	\$0.60	15 per cent. to No. 19, inclusive	\$1.15
6 " " " " " "	.70	16 " " " " " "	1.20
9 " " " " " "	.85	18 " " " " " "	1.30
12 " " " " " "	1.00		

Add the Brass Tubing List advance for numbers, sizes and cutting to length.

D 58.

BRAZED BRASS TUBING

For Manufacturers of Plumbers' Supplies.

We Solicit Your Orders for Sheet Brass Cut to Special Size.

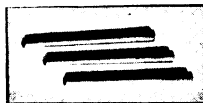
For Weight of Sheet Brass, see Table Back of Book.

D 59.

BRAZED TAPER TUBES.

WEIGHING,

Per Lb.



2½ lbs. each, and heavier	\$0.80
2 lbs. each, and not heavier than 2½ lbs. each....	.90
1 lb. each, and not heavier than 2 lbs. each	1.00
12 oz. each, and not heavier than 16 oz. each	1.10
8 oz. each, and not heavier than 12 oz. each.....	1.20
4 oz. each, and not heavier than 8 oz. each.....	1.30
lighter than 4 oz. ea., special price not less than	2.00

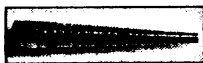
D 60.

IRON LINED TUBING.—Not Polished.

	PER 100 FEET.			PER 100 FEET.	
	Brass.	Bronze.		Brass.	Bronze.
¾ inch.....	\$ 8.00	\$ 9.00	1½ inch.....	\$22.00	\$24.00
1½ ".....	8.00	9.00	1¾ ".....	25.00	27.00
2 ".....	10.00	11.00	1¾ ".....	32.00	35.00
2½ ".....	12.00	13.00	1¾ ".....	45.00	48.00
3 ".....	14.00	15.00	2 ".....	56.00	60.00
4 ".....	18.00	20.00			

In lengths from 2 feet to 12 feet.

D 61.

BRASS TELESCOPE TUBING.

Mandrel-drawn. Each size fits into each larger size to 1 1-16 inch. Made from Brass 1-32 inch thick.

Outside Diameter.	Price per Foot.	Outside Diameter.	Price per Foot.	Outside Diameter.	Price per Foot.
1-8 inch.....	\$0.15	9-16 inch....	\$0.25	1 inch.....	\$0.45
3-16 ".....	.15	5-8 ".....	.30	1 1-16 ".....	.45
1-4 ".....	.20	11-16 ".....	.30	1 1-4 ".....	.60
5-16 ".....	.20	3-4 ".....	.35	1 1-2 ".....	.80
3-8 ".....	.20	13-16 ".....	.35	1 3-4 ".....	.90
7-16 ".....	.25	7-8 ".....	.40	2 ".....	1.00
1-2 ".....	.25	15-16 ".....	.40		

**D 62. BRASS TELESCOPE TUBING.**

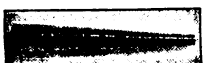
1-32 Inch Thick, Measured Outside.

	Per Ft.		Per Ft.		Per Ft.
1 inch.....	\$0.45	1 9-16 inch.....	\$0.80	2 1-8 inch.....	\$1.10
1 1-16 ".....	.45	1 5-8 ".....	.85	2 3-16 ".....	1.10
1 1-8 ".....	.50	1 11-16 ".....	.85	2 1-4 ".....	1.20
1 3-16 ".....	.50	1 3-4 ".....	.90	2 5-16 ".....	1.20
1 1-4 ".....	.60	1 13-16 ".....	.90	2 3-8 ".....	1.30
1 5-16 ".....	.60	1 7-8 ".....	.95	2 7-16 ".....	1.30
1 3-8 ".....	.70	1 15-16 ".....	.95	2 1-2 ".....	1.40
1 7-16 ".....	.70	2 ".....	1.00		
1 1-2 ".....	.80	2 1-16 ".....	1.00		

**D 63. BRASS TELESCOPE TUBING.**

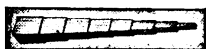
1-16 Inch Thick, Measured Outside.

	Per Ft.		Per Ft.		Per Ft.
2 1-2 inch.....	\$1.85	3 1-8 inch.....	\$2.35	4 inch.....	\$3.00
2 5-8 ".....	1.95	3 1-4 ".....	2.45	4 1-2 ".....	3.50
2 3-4 ".....	2.05	3 3-8 ".....	2.60	5 ".....	4.00
2 7-8 ".....	2.15	3 1-2 ".....	2.75	6 ".....	5.00
3 ".....	2.25	3 3-4 ".....	2.85		

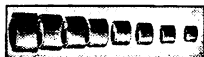
**D 64. BRASS TELESCOPE TUBING.****VERY LIGHT.**

Made from Brass 1-64 inch thick. Each size outside diameter fits into the same size inside diameter.

	Per Ft.		Per Ft.
1-8 inch outside diameter.....	\$0.15	5-8 inch outside diameter.....	\$0.30
1 8 " inside ".....	.15	5-8 " inside ".....	.30
1-4 " outside ".....	.20	3-4 " outside ".....	.35
1-4 " inside ".....	.20	3-4 " inside ".....	.35
3-8 " outside ".....	.20	7-8 " outside ".....	.40
3-8 " inside ".....	.20	7-8 " inside ".....	.40
1-2 " outside ".....	.25	1 " outside ".....	.45
1-2 " inside ".....	.25	1 " inside ".....	.45

**SQUARE BRASS TELESCOPE TUBING.****D 65.**1-32 inch thick, Measured Outside.
Telescopes from 1-4 inch to 1 inch.

	Per Ft.		Per Ft.		Per Ft.
1-4 inch.....	\$0.25	5-8 inch.....	\$0.40	1 inch.....	\$0.60
5-16 ".....	.27	11-16 ".....	.42	1 1-4 ".....	.90
3-8 ".....	.30	3-4 ".....	.45	1 1-2 ".....	1.20
7-16 ".....	.32	13-16 ".....	.48	1 3-4 ".....	1.50
1-2 ".....	.35	7-8 ".....	.50	2 ".....	1.75
9-16 ".....	.38	15-16 ".....	.55		

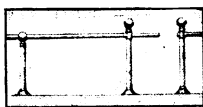
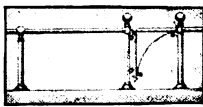
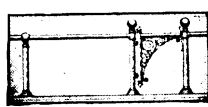
**D 66.****SEAMLESS BRASS FERRULES.**

CHISEL HANDLE.

Diameter Measured Inside.

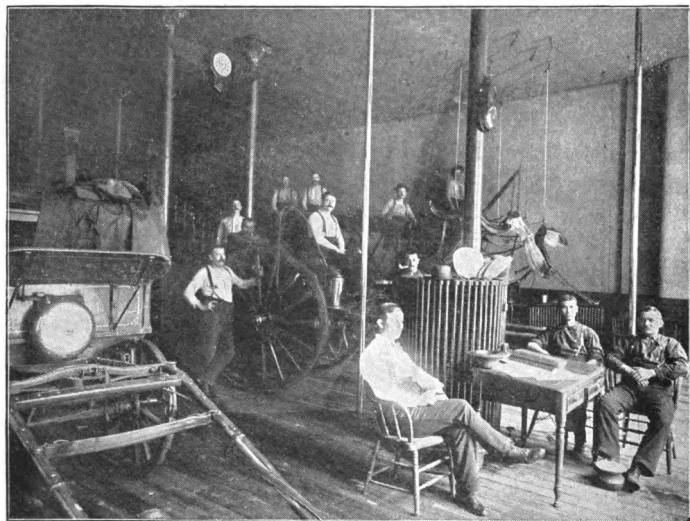
Numbers.....	00	0	1	2	3	4	5	6	7	8	9	10
Inches, dia....	1	15-16	7-8	13-16	3-4	11-16	5-8	9-16	1-2	7-16	3-8	5-16
Per gross.....	\$1.50	1.30	1.10	.88	.75	.70	.65	.55	.45	.45	.45	.45

Assorted, 90 cents per gross.

**D 67.****COPPER SHIMS OR EXPANDING RINGS.**State quantities and sizes wanted.
Special prices on application.**BRASS RAILING.****D 68.****D 69.****D 70.**

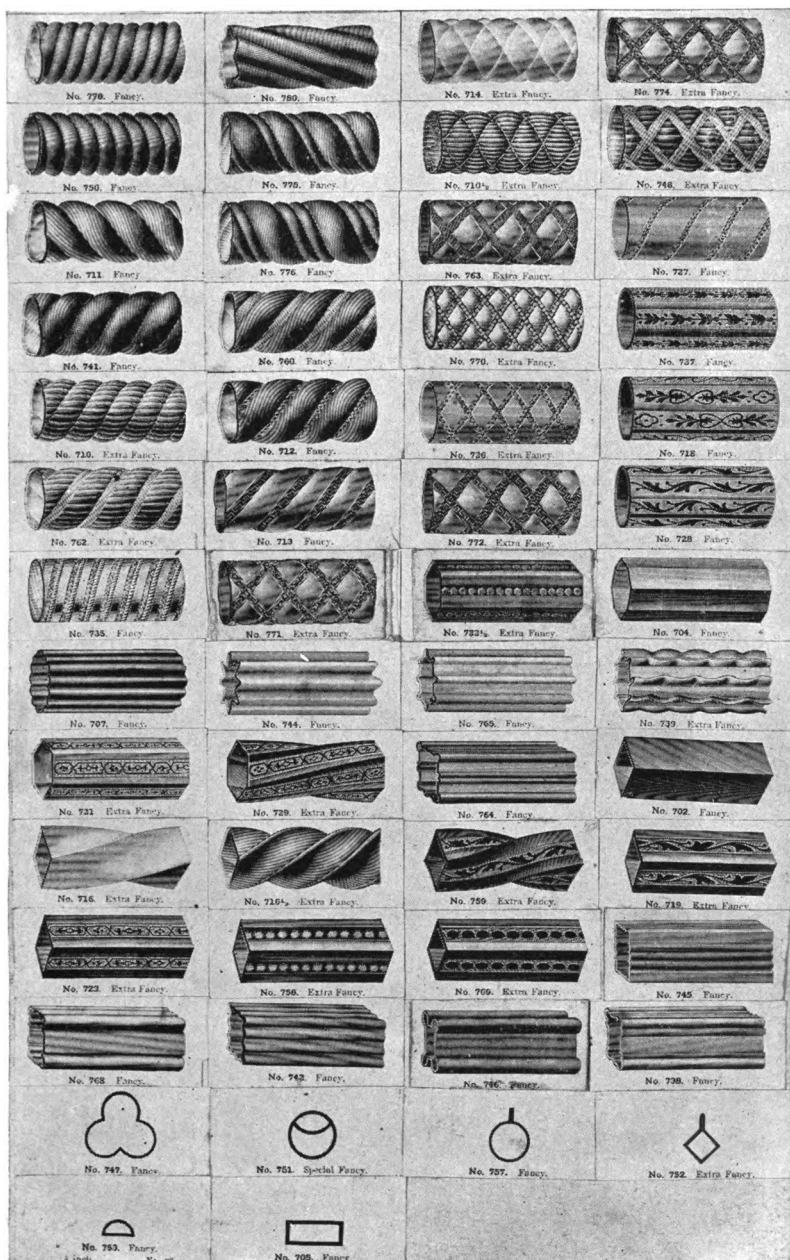
1 1/4 inch Brass Rail.....	Price per foot,	\$0.50	Nickel Plated,	\$0.65
2 inch Brass Posts (Ball Top)....	Price each,	3.00	"	3.50
Telescope Gate (like D 68).....	"	3.50	"	4.00
Swinging Gate (like D 69).....	"	3.50	"	3.75
Swinging Gate (like D 70).....	"	10.00	"	11.00
Swinging Gate (like D 70).....	"	12.50	"	15.00

Send diagram of railing desired, and we will give you an estimate on same.

BRASS SLIDING POLES FOR FIRE ENGINE HOUSES.**D 71.** Extra long lengths carried in stock. Prices upon application.

D 72.

FANCY BRAZED BRASS TUBING.



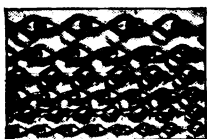
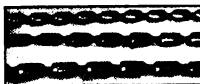
Fancy Brass Tubing, advance, 8 cents; Extra fancy patterns, 16 cents; above list tubing, D 52-54.

We carry above designs in stock at mill, and can furnish promptly.

Try our Brush Copper for Electrical Work.

BRASS AND IRON JACK CHAIN.

PRICE PER BOX OF 12 YARDS.

**D 73. Single.****D 74. Safety.****D 75. Double.**

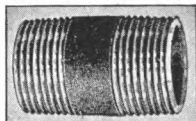
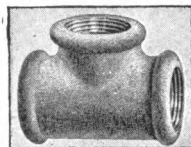
D 73. SINGLE.				D 75. DOUBLE.			
No.	Iron.	Brass.	Nickel Plated or Silvered.	No.	Iron.	Brass.	Nickel Plated or Silvered.
5....		\$8.00	\$10.00	5....			
6....	\$1.60	7.00	8.75	6....			
7....	1.40	6.60	8.25	7....			
8....	1.30	5.70	7.12½	8....			
9....	1.20	5.00	6.25	9....			
10....	1.00	4.00	5.00	10....	\$1.30	\$4.50	\$5.62½
11....	.80	3.30	4.12½	11....	1.10	3.70	4.62½
12....	.70	2.40	3.00	12....	1.00	3.20	4.00
13....	.60	2.00	2.50	13....	.90	2.60	3.25
14....	.50	1.50	1.87½	14....	.80	2.00	2.50
15....	.40	1.10	1.37½	15....	.70	1.60	2.00
16....	.36	.90	1.12½	16....	.60	1.40	1.75
17....	.32	.70	.87½	17....	.50	1.20	1.50
18....	.30	.60	.75	18....	.44	1.00	1.25
19....	.28	.54	.67½	19....	.40	.90	1.12½
20....	.28	.50	.62½	20....	.40	.80	1.00
21....	.26	.44	.55	21....	.38	.70	.87½
22....	.24	.40	.50	22....	.36	.60	.80
23....	.24	.40	.50	23....	.36	.60	.80
24....	.24	.40	.50	24....	.36	.60	.80

D 74. SAFETY CHAIN.—Price per Box of 12 Yards.

Number.....	000	00	0	1	2	3
Brass.....	\$1.20	\$1.30	\$1.50	\$1.80	\$2.40	\$3.60
Silvered.....	1.35	1.45	1.65	1.95	2.55	3.75
Nickled.....	1.45	1.55	1.75	2.05	2.65	3.85

**D 77. LADDER CHAIN.**

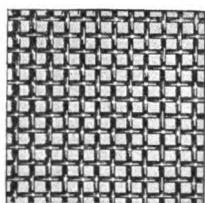
Price, per yard, No. 18..... per box, \$2.25

**D 78. SIGNAL SAFETY CHAIN.**No. 2. Steel, 6c.;
Brass, 10c.; Bronze,
12c. per foot,**BRASS FITTINGS FOR STEAM AND GAS PIPE—ROUGH.****D 79.****D 80.****D 81.**

Size, Inches.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows.....	.12	.17	.21	.28	.35	.50	.85	1.10	1.50	3.50	4.50	7.00	10.00
“ Reducing.....	.22	.26	.35	.45	.62	1.10	1.40	1.90	4.40	5.65	8.75	12.50	
Tees.....	.15	.20	.30	.40	.50	.75	1.00	1.30	1.75	4.00	5.50	9.00	13.00
“ Reducing.....	.25	.38	.50	.63	.95	1.25	1.65	2.20	5.00	6.90	11.25	16.25	
Crosses.....	.30	.40	.50	.60	.80	1.50	2.00	3.50	5.00	7.00	10.00	14.50	
“ Reducing.....	.38	.50	.65	.75	1.00	1.90	2.50	4.40	6.25	8.75	12.50	18.00	
Reducers.....	.16	.22	.32	.45	.65	.90	1.12	1.85	3.00	4.50	.....	.....	.....
Plugs.....	.09	.10	.12	.15	.20	.28	.40	.50	.90	1.25	2.00	3.00	4.00
Caps.....	.15	.15	.20	.25	.35	.45	.60	.80	1.10	2.00	3.00	.....	.....
Locknuts.....	.10	.12	.15	.20	.30	.45	.70	.95	1.50	2.75	.....	.....	.....
Bushings.....	.10	.12	.14	.21	.38	.50	.67	1.00	1.50	2.50	.....	.....	.....
Street Ells.....	.....	.....	.55	.75	1.00	1.80	.....	.....	.....	.....	.....	.....	.....
Couplings.....	.10	.14	.16	.25	.37	.50	.60	.90	1.35	2.40	3.50	.....	.....
“ R. & L.....	.17	.20	.30	.45	.60	.75	1.12	1.75	.....	.....	.....	.....	.....
Unions, Grd. Jt.....	.35	.40	.55	.75	1.00	1.40	1.90	2.75	4.00	6.50	8.50	.....	.....

Price of Finished double above list of rough fittings.

D 82. BRASS AND COPPER WIRE CLOTH.



Regular Market Grade.			Price per Square Foot.		
Meshes.	No. of		Meshes.	No. of	
Per inch.	Wire.		Per inch.	Wire.	
2	16	\$0.50	20	28	\$0.50
3	17	.50	22	29	.52
4	18	.50	24	30	.52
5	19	.50	30	31	.52
6	20	.50	40	33	.55
8	22	.50	50	35	.58
10	23	.50	60	36	.60
12	24	.50	70	37	.70
14	25	.50	80	38	.90
16	26	.50	90	39	1.10
18	27	.50	100	40	1.30

Twilled Cloth, 10 cents per foot advance on Plain Cloth.

D 83. EXTRA FINE BRASS WIRE CLOTH.

No. 110 Mesh Plain..per sq. ft., \$1.35	No. 130 Mesh Twilled, per sq. ft., \$2.00
" 120 " " " " 1.60	" 140 " " " " 2.45
" 110 " Twilled, " " 1.45	" 150 " " " " 3.00
" 120 " " " " 1.70	

D 84. MILK STRAINERS.

Per square foot....40 Mesh.....18c. | 50 Mesh.....22c. | 60 Mesh.....35c

PAPER MILL SUPPLIES.

D 85. FOURDRINIER WIRE.

OF THE BEST MATERIAL AND WORKMANSHIP.

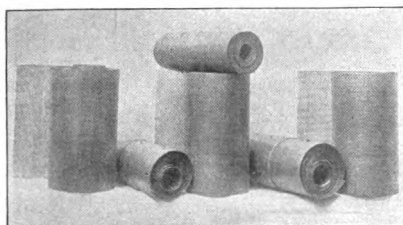
No. 60.....per square foot, \$0.60 | No. 70.....per square foot, \$0.70

D 86. CYLINDER AND WASHER WIRES.

PRICE PER SQUARE FOOT.

All meshes to	No. 30 \$0.52	No. 50..... \$0.58	No. 70..... \$0.70
No. 30... \$0.50	" 40..... .55	" 60..... .60	" 80..... .90

Extra Charge for Copper Cloth.



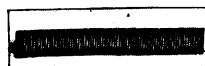
D 87.

PERFORATED SHEET BRASS.

11 & 12 in. wide kept in stock.

No. 0	1	2	3	4	5	6
Price, 90c.	75c.	65c.	60c.	55c.	50c.	50c. sq. ft.

Above cuts show exact size of holes.



D 88.

COILED SPRINGS.

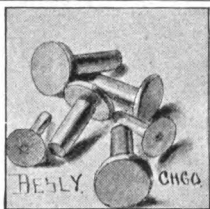


D 89.

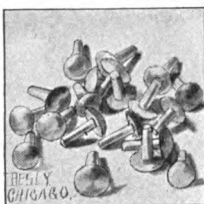
Made from Brass Spring Wire, Wound Close.

IN 15-INCH LENGTHS.—PRICE PER LENGTH.

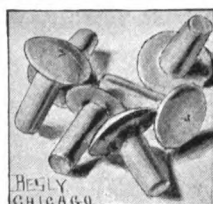
No. Wire.	No. Wire.	No. Wire.
3-32 inch ....28.....\$0.16	3-8 inch ....19.....\$0.40	3-4 inch .....15.....\$0.80
3-16 "22..... .20	7-16 "18..... .45	7-8 "15..... .90
1-4 "20..... .25	1-2 "17..... .50	1 "13..... 1.00
5-16 "20..... .30	5-8 "17..... .65	



D 90. Belt.



D 91. Jacket.



D 92. Braziers'.

COPPER RIVETS AND BURS—With Extra Large Heads.

D 90.

Prices for Belt Hose and Trunk Rivets.

No.....	7	8	9	10	11	12	13	14	15
Price per lb....	.49	.50	.52	.54	.56	.58	.60	.65	.70

Brass Rivets not less than Copper. Copper and Brass Rivets and Burs made to particular sizes and patterns, special prices, not less than corresponding rates.

We keep No. 9 and No. 12 Trunk Rivets in stock. List same as Belt Rivets.

D 91. **BRASS JACKET RIVETS.** 1-4 inch, No. 9, per lb.....\$0.75

D 92.

BRAZIER'S' COPPER RIVETS.

We keep in stock.....Nos. 0 1 2 3 4 5 6 7 8 inch.
In five-pound paper boxes. Price per lb.....\$0.43



D 95.

COPPER NAILS.

Size, inches..... $\frac{3}{4}$ 1 1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2 2 $\frac{1}{4}$ 2 $\frac{1}{2}$
Price per lb.....\$0.60

D 96.

COPPER TACKS.

Price per Pound, 75 cents.

Ounce, 6 8 10 12 14 16 18 20 22 24
Length, 1-2 9-16 5-8 11-16 3-4 13-16 7-8 15-16 1 1 1-8



BRASS ESCUTCHEON PINS

D 97.

Round Heads.

IN POUND PAPER BOXES.

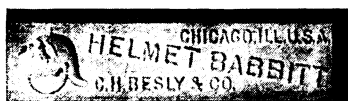
INCH.	3-16	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2
Wire Gg.													
10.....			\$0.75	\$0.73	\$0.72	\$0.71	\$0.70	\$0.69	\$0.68	\$0.67	\$0.66	\$0.65	\$0.65
11.....			.76	.74	.73	.72	.71	.70	.69	.68	.67	.66	.66
12.....			.77	.75	.74	.73	.72	.71	.70	.69	.68	.67	.67
13.....			.78	.76	.75	.74	.73	.72	.71	.70	.69	.69	.69
14.....	\$0.90	\$0.83	.80	.77	.76	.75	.74	.73	.72	.71	.70	.70	.70
15.....	.95	.85	.82	.78	.77	.76	.75	.74	.73	.72	.72	.72	.72
16.....	1.00	.90	.85	.82	.80	.78	.76	.75	.74	.74	.74	.74	.75
17.....	1.10	1.00	.92	.89	.87	.85	.83	.81	.80	.80	.80	.81	.82
18.....	1.20	1.10	1.00	.96	.94	.92	.90	.90	.90	.92	.92	.93	.95
19.....	1.35	1.20	1.15	1.10	1.05	1.00	1.00	1.03	1.03	1.03	1.05		
20.....	1.55	1.35	1.25	1.20	1.15	1.10	1.10	1.15	1.15	1.15			
21.....	1.75	1.55	1.45	1.35	1.30	1.30	1.35	1.35					
22.....	2.00	1.75	1.60	1.45	1.40	1.45							

Silver Plated, 20 cents per lb. net advance on above prices.

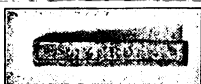
Pins made to order from 0 to 24 Wire Gauge, and from 1-32 to 4 inches in length. All sizes not on list made to order.

Try our Brush Copper for Electrical work.

D 98.

**HELMET BABBITT.**Boxes containing 50 or 100 lbs. Bars
about 3 lbs. each.

Price, per lb..... 40c.

**D 99. POST'S ZERO METAL.**

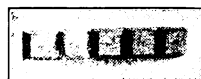
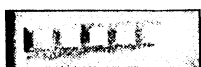
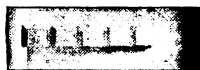
Price, per lb..... 30c.

**D 100. RAILWAY SPECIAL BABBITT.**

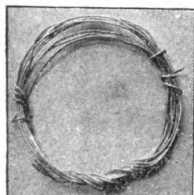
Price, per lb..... 30c.

**D 101. MAGNOLIA BABBITT METAL.**

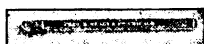
Price, per lb..... 40c.

REGULAR BABBITT METAL.**D 102.****D 103.****D 104.****PRICE PER POUND.**

Engine..... 40c.	Crescent.... 30c.	No. 1..... 20c.	No. 4, ext.... 9c.
Genuine..... 35c.	Extra..... 25c.	" 2..... 15c.	" 4..... 6c.
		" 3..... 12c.	

SOLDER.**D 105.****WIRE
SOLDER.**

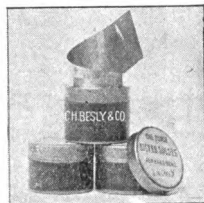
Per lb....\$0.25

**D 106. BAR
SOLDER.
STRICTLY
HALF-AND-HALF.**

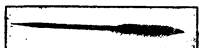
Per lb....\$0.25

D 108.**SILVER
SOLDER.**

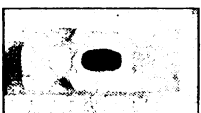
Per oz..\$1.25

**D 107.****SPELTER
SOLDER for
BRAZING.**

Per lb.
Coarse...\$0.35
Medium... .40
Fine..... .45
Extra Fine .50

**COMMERCIAL, per lb.....\$0.20****INGOT BRASS.....At Market Rates.****INGOT COPPER...At Market Rates.****D 109. SOLDERING COPPERS.****POINTED PATTERN.**

1-2	1	1 1-2	2	3	4	5	6	8	10	12 lbs. to pair.
40c.	40c.	60c.	80c.	\$1.20	\$1.60	\$2.00	\$2.40	\$3.20	\$4.00	\$4.80 per pair

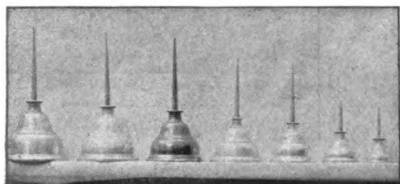
**D 110. COPPER HAMMERS.**

Price..... 40c. per lb.

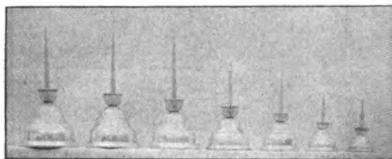
Solicit Your Orders for Sheet Brass Cut to Special Size.

For Weight of Sheet Brass, see Table Back of Book

SPUN ZINC AND BRASS OILERS.



D 111. Plain Pattern.



D 112. With Drip Cup.

WITH TIN BOTTOM.

Numbers	00	0	1	2	3	4	5	6
D 102. Zinc, Plain.....	\$1.00	1.25	1.50	2.00	2.25	2.75	3.50	4.50 per doz.
D 103. Zinc, Drip Cup... ..	2.00	2.25	3.00	3.25	3.75	4.50	5.50	"

WITH BRASS BOTTOM.

Numbers	0	1	2	3	4	5	6
D 102. Zinc, Plain.....	\$1.50	1.75	2.50	3.00	3.50	4.50	5.50 per doz.
D 103. Zinc, Drip Cup ..	2.25	2.50	3.50	4.00	4.50	5.50	6.50 "
Numbers.....	0	1	2	3	4	5	6
D 102. Brass, Plain.....	\$2.25	2.50	3.50	4.00	4.75	6.00	7.50 per doz.
D 103. Brass, Drip Cup...	3.00	3.50	4.50	5.25	6.00	7.00	8.50 "



D 113. Zinc.



D 114. Brass.

OIL CAN FILLERS FOR ENGINEERS.

Size.	Zinc.	Brass.	Copper.
$\frac{1}{2}$ Pint.....per dozen,	\$3.50	.....	.....
$\frac{1}{2}$ "each,	.35	.....	.....
1 Pint.....per dozen,	4.00	\$12.00	\$12.00
1 "each,	.40	1.25	1.50
$1\frac{1}{2}$ Pint... ..per dozen,	5.00	18.00	18.00
$1\frac{1}{2}$ "each,	.50	1.50	1.50
1 Quart... ..per dozen,	6.00	21.00	21.00
1 "each,	.60	2.25	2.25



D 115. EVERLASTING BRAZED STEEL HAND LAMP.

		Per Doz.
No. 130.	$\frac{1}{2}$ -Pint Steel Hand Lamp, any style burner,	\$6.00
" 131.	$\frac{3}{8}$ -Pint " " " " " "	6.50
" 132.	1-Pint " " " " " "	7.00

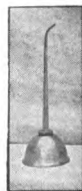
STEEL OILERS.



D 116.

	Number.	Dimension	Diameter.	Lgth Spout.	Per Doz.
D 116.	304	Steel	$3\frac{3}{4}$	4 inches	\$6.00
D 117.	309	Steel	$3\frac{3}{4}$	9 "	7.00

Spout and body polished. Extra heavy steel nozzle. Solid cut-brass bushings. Nozzle 6-inch and upwards, furnished bent unless otherwise ordered. All lengths are interchangeable. We also furnish this oiler in nickel finish and in brass.



D 117.

D 118. EVERLASTING BRAZED STEEL OILER.



	Number.	Capacity.	Length Nozzle.	Price Per Dozen.
D 118.	30	1 Pint	8 inches	\$ 9.00
	31	1 Quart	10 "	10.00
	32	2 Quarts	12 "	12.00

Heavy steel; all brazed; no repairs; no leaks. A vent controls the flow of oil.



D 119.

D 119. EVERLASTING BRAZED STEEL BROAD-TOP OILERS.

No.	Capacity.	Lgh. Noz.	Price per Doz.	No.	Capacity.	Lgh. Noz.	Price per Doz.
20	1 Pint	8 in.	\$12.00	22	1 Quart	12 in.	\$13.00
21	1½ Pints	10 "	12.00	23	2 Quarts	12 "	15.00

Nozzles every length will be shipped straight unless otherwise ordered.



D 120. PYRAMID STEEL TORCH.

No.	Capacity.	Lgh. Noz.	Price per Doz.
80.	½ Pint	1 Burner Pyramid Steel Torch	\$ 7.00
81.	1 "	"	9.00
82.	1 Quart	1 "	10.00
83.	1 "	2 "	11.00
84.	2 "	1 "	12.00
85.	2 "	2 "	13.00
86.	4 "	2 "	15.00
87.	4 "	3 or 4 Burner "	18.00



D 121. BROAD TOP STEEL TORCH.

No.	Capacity.	Lgh. Noz.	Price per Doz.
90.	1 Pint	1 Burner Steel Broad-Top Torch	\$ 9.00
91.	1 Quart	1 "	10.00
92.	1 "	2 "	11.00
93.	2 "	1 "	12.00
94.	2 "	2 "	13.00
95.	1 Gallon	2 "	15.00
96.	1 "	3 or 4 B'ner "	18.00



D 122.

BRONZED STEEL AND BRASS RAILROAD OILERS

Number.	Dimensions.	Diameter.	High.	L'gth of Spout.	Capacity.	Per Dozen.
10	Steel	3¾ in.	5 inches	12 inches	1 Pint	\$14.00
11	Steel	4½ "	6 "	18 "	1 Quart	18.00
11A	Steel	5 "	8 "	9 or 14 "	2 Quarts	24.00
17	Brass	3¾ "	5 "	12 "	1 Pint	18.00
18	Brass	4½ "	6 "	18 "	1 Quart	21.00
18A	Brass	5 "	8 "	9 or 14 "	2 Quarts	24.00

These Oilers have seamless drawn bodies, are indestructible, and are used by the leading railroads of the country.

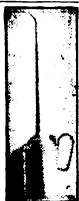


D 123.

IMPROVED STANDARD BRONZED STEEL RAILROAD OILERS.

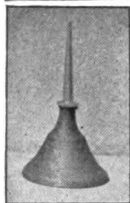
Number.	Di-m'ns.	Diameter.	High.	L'gth of Spout.	Capacity.	Per Doz.
100.....	Steel	3¾ in.	6¼ in.	9 in.	1 Pt.	\$14.00
101.....	Steel	4½ "	6 "	10 "	1 Qt.	18.00
111.....	Steel	5 "	8 "	9 or 14 "	2 Qts	20.00

These Railroad Oilers are of the regular standard sizes and patterns used on all railroads. They are made of two heavy steel seamless drawn parts, with large nozzle, 1½ inches at base and 9 to 14 inches in length. They are especially adapted for Locomotives and Stationary Engines.



D 124. LONG SPOUT TIN OILERS.

Number.	Capacity.	Diameter.	High.	L'gth of Spout.	Per Doz.	Each.
1.....	1 Pint	3 in.	5½ in.	8 in.	\$3.75	\$0.40
2.....	1½ "	3½ "	6 "	12 "	4.25	.45
3.....	1 Quart	3¾ "	6¾ "	18 "	4.50	.45



D 125.



D 126.



D 127.

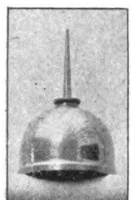


D 128.

MALLEABLE IRON OILERS AND LAMPS.

Number	D 125. 1	D 126. 2	D 127. 3	D 128. Malleable Hand Lamps.
Per Dozen.....	\$3.60	\$4.00	\$4.40	\$5.00
Each .....	.35	.40	.45	.50

Extra Tubes for Hand Lamps, per dozen, \$1.80.

BRONZED STEEL OILERS.

D 129.

No.	Steel Oiler,	2 3/4 in. diam.,	2 1/2 in. straight nozzle,	PER DOZ.
No. 12.				\$4.50
" 13.	"	3 3/4	" 3	" 5.50
" 13A.	"	3 3/4	" 5	" 6.00
" 14.	"	3 3/4	" 9 bent	" 6.50
" 14A.	"	3 3/4	" 3 straight	" 7.50
" 14AA.	"	3 3/4	" 5	" 8.00
" 14B.	"	3 3/4	" 9 bent	" 8.50
" 15.	"	4 1/4	" 3 straight	" 9.25
" 15A.	"	4 1/4	" 5	" 9.75
" 16.	"	4 1/4	" 9 bent	" 10.50

The largest Steel Spring Bottom Oiler made in the country.

These Oilers we claim are the best manufactured in the country, and are used by the leading machinists and railroads.



D 130.

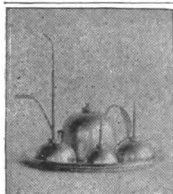


D 131.

BRASS OILERS.

No.	INCH DIAM.	PER DOZEN.
No. 120.	D 130, 2 3/4, 2 1/2 in. straight nozzle,	\$ 6.50
" 130.	D 130, 3 3/4, 3	" 8.00
" 140.	D 131, 3 3/4, 9 bent	" 9.20
" 140A.	D 130, 3 3/4, 3 straight	" 10.20
" 140B.	D 131, 3 3/4, 9 bent	" 11.20
" 150.	D 130, 4 1/4, 3 straight	" 12.00
" 160.	D 131, 4 1/4, 9 bent	" 14.00

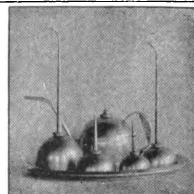
These Oilers are made of very heavy stock and handsomely finished, and no one can realize what nice goods they are until they have tried them.



D 132.

ENGINEERS' SETS.

These Oilers are made of very heavy brass, with machine-cut screw and drilled nozzles. They are beautifully finished, and are the finest that are made.



D 133.

PRICE OF ENGINEERS' SETS.

No. 30.	D 132.	5 Pieces, Brass, including Tray.....	\$ 6.00
" 40.	D 133.	6 Pieces, Brass, including Tray.....	9.00
" 50.	D 132.	5 Pieces, Nickeled, including Tray.....	8.00
" 60.	D 133.	6 Pieces, Nickeled, including Tray.....	11.00

PRICE OF STEAMBOAT SETS.

No. 70.	D 132.	5 Pieces, Brass, inc. Tray, Recessed to receive Oilers....	\$ 7.00
" 80.	D 133.	6 Pieces, Brass, inc. Tray, Recessed to receive Oilers....	10.00
" 90.	D 132.	5 Pieces, Nickeled, inc. Tray, Recessed to receive Oilers, ..	9.00
" 100.	D 133.	6 Pieces, Nickeled, inc. Tray, Recessed to receive Oilers, ..	12.00

PRICE OF EXTRA TRAYS.

12-inch Tray, as on No. 30 Set, each.....	\$1.50
14-inch Tray, as on No. 40 Set, each.....	1.75



D 134.

BRONZED STEEL AND BRASS ENGINEERS' FILLERS.

							PER DOZ.
No. 19.	1-pint	Steel Fillers,	4 1/8 in. diameter,	3 1/2 in. high,	Screw Top.		\$14.00
" 19A.	1 1/2 "	"	" 4 3/4 "	" 4 "	"	"	17.00
No. 210.	1-quart	"	" 5 "	" 5 "	"	"	20.00
" 211.	2-quart	"	" 6 "	" 6 "	"	"	24.00
" 190.	1 1/2 -pint	Brass Fillers,	4 3/4 "	" 4 "	"	"	22.00
" 200.	1-quart	"	" 5 "	" 5 "	"	"	30.00
" 201.	2-quart	"	" 6 "	" 6 "	"	"	34.00

These Fillers are made of very heavy stock, and handsomely finished in both Brass and Steel.



D 135. BRONZED STEEL JACKET LAMPS.

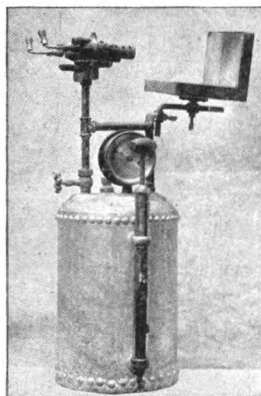
No. 20.	3 3/8 inch diameter,	per dozen	\$ 6.00
" 20 1/2.	3 3/4 "	"	9.00
" 21.	4 1/8 "	"	12.00

Nos. 20 1/2 and 21 can be used with either round torch wick or the flat wick burner for use with a chimney.

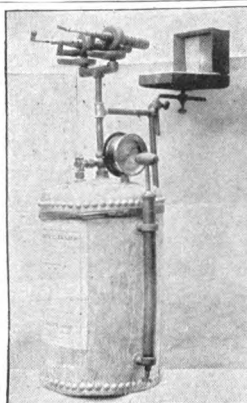


D 136. COPPERIZED STEEL MOWING MACHINE
OILERS.

Num- ber.	Diam- eter.	High.	L'gth of Spout.	Capac- ity.	Per Dozen.	Each.
600	3 in.	4 1/2 in.	5 in.	1 Pint.	\$8.00	\$0.80



D 137—Small.



D 138—Large.

BICYCLE BRAZIERS.

D 137.	Small.	5-Gallon Tank.	Price each	\$25.00
D 138.	Large.	10-Gallon Tank.	Price each	35.00

Write for Descriptive Circular.

OIL WASTE CAN.



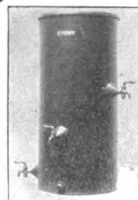
D 139.

Diameter, 11 1/4 inches;
height, 15 inches.
Price each.....\$2.50

D 140. THE CROSS OIL FILTER AND PURIFIER.

Size.	Capacity.	Price Each.
No. 1	15 to 20 Gallons per Day	\$25.00
No. 2	3 to 5 Gallons per Day	15.00

Write for Circular illustrating
and describing above in
detail.



D 140.

HOT BLAST TORCHES AND FURNACES.



D 141.

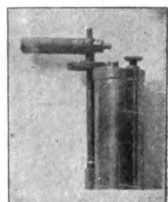
**WALSH
GASOLINE
MOUTH
BLOW-PIPE
TORCH.**

Price each....\$3.50

D 142.

**WALSH
CONTINUOUS
BLAST
GASOLINE
TORCH.**

Price each....\$5.00



D 143.

**JUNIOR
HOT BLAST
BLOW
TORCH.**

Price each..\$3.50

**D 144. VULCAN HOT BLAST
BLOW TORCH.**



Price each.....\$5.00



D 145.

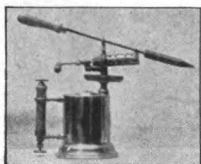
**IMPERIAL
HOT BLAST
BLOW TORCH.**

Price each....\$5.00

D 146.

**PLUMBERS'
GASOLINE
TORCH.**

Price each..\$5.00



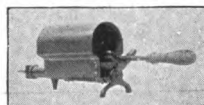
D 147.

**COMBINATION
HOT BLAST
BLOW TORCH.**

Price each.....\$7.50

D 148.

**C. H. B. SOLDERING IRON
HEATERS, FOR GAS.**



Price each.....\$2.50

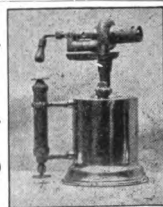


**D 149. ELECTRIC
HOT BLAST
TORCH.**

Price each....\$5.00

**D 150. BRAZIER'S
HOT BLAST
BLOW TORCH.**

Price each....\$7.50



D 151.

**COMBINA-
TION HOT
BLAST
FURNACE.**

Price each,
\$10.00

D 152.

**TINNERS'
HOT BLAST
FURNACE.**

Price each....\$10.00

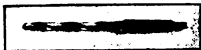


We Solicit Your Orders for Sheet Brass Cut to Special Size.

**For Weight of Sheet Brass, see Table Back of Book
Try our Brush Copper for Electrical Work.**

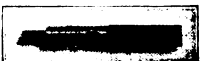
D 153.

TWIST DRILLS, TAPER SHANK.



For size of drill to use in tapping holes, and table for speed of drills, see back of catalogue.

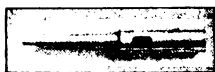
Diameter.	Length.	Price each.	Socket for Morse Taper.	Diameter.	Length.	Price each.	Socket for Morse Taper.
1-4	6 1/8	\$0.60	No. 1. \$1.20.	1 9-32	14 1/8	\$1.65	No. 4. \$4.00.
9-32	6 1/4	.65		1 5-16	14 1/4	4.80	
5-16	6 3/8	.70		1 11-32	14 3/8	5.00	
11-32	6 1/2	.75		1 3-8	14 1/2	5.20	
3-8	6 3/4	.80		1 13-32	14 5/8	5.40	
13-32	7	.85		1 7-16	14 3/4	5.60	
7-16	7 1/4	.90		1 15-32	14 7/8	5.80	
15-32	7 1/2	.95		1 1-2	15	6.00	
1-2	7 3/4	1.00		1 17-32	15 1/8	6.30	
17-32	8	1.10		1 9-16	15 1/4	6.60	
9-16	8 1/4	1.20	No. 2. \$1.80.	1 19-32	15 3/8	6.90	No. 5. \$7.50.
19-32	8 1/2	1.30		1 5-8	15 1/2	7.20	
5-8	8 3/4	1.40		1 21-32	15 5/8	7.50	
21-32	9	1.50		1 11-16	15 3/4	7.80	
11-16	9 1/4	1.60		1 23-32	15 7/8	8.10	
23-32	9 1/2	1.70		1 3-4	16	8.40	
3-4	9 3/4	1.85		1 25-32	16 1/8	8.60	
25-32	9 7/8	2.00		1 13-16	16 1/4	8.80	
13-16	10	2.15		1 27-32	16 3/8	9.00	
27-32	10 1/4	2.30		1 7-8	16 1/2	9.20	
7-8	10 1/2	2.45	No. 3. \$2.50.	1 29-32	16 5/8	9.35	No. 5. \$7.50.
29-32	10 3/8	2.60		1 15-16	16 1/2	9.50	
15-16	10 3/4	2.75		1 31-32	16 3/4	9.65	
31-32	10 7/8	2.90		2	16 1/2	9.80	
1	11	3.00		2 1-32	16 1/2	10.20	
1 1-32	11 1/8	3.20		2 1-16	17	10.60	
1 1-16	11 1/4	3.40		2 1-8	17	11.20	
1 3-32	11 1/2	3.60		2 3-16	17	12.00	
1 1-8	11 3/4	3.80		2 1-4	17 1/2	12.80	
1 5-32	11 7/8	4.00		2 5-16	17 1/2	13.60	
1 3-16	12	4.20	No. 3. \$2.50.	2 3-8	18	14.40	No. 5. \$7.50.
1 7-32	12 1/8	4.40		2 7-16	18 1/2	15.00	
1 1-4	12 1/2	4.50		2 1-2	19	15.60	



STEEL SOCKETS FOR TAPER SHANK DRILLS.

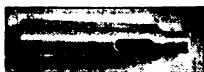
D 154. No. 100.

No. 1.	Holds 1-4 to 19-32 inch, inclusive.....	\$1.20
	Entire length, 7 inches; diameter of blank end, 1 1-8 inch.	
No. 2.	Holds 5-8 to 29-32 inch, inclusive.....	1.80
	Entire length, 8 inches; diameter of blank end, 1 1-4 inch.	
No. 3.	Holds 15-16 to 1 1-4 inch, inclusive.....	2.50
	Entire length, 10 inches; diameter of blank end, 1 1-2 inch.	
No. 4.	Holds 1 9-32 to 2 inches, inclusive.....	4.00
	Entire length, 13 inches; diameter of blank end, 2 inches.	
No. 5.	Holds 2 1-16 to 3 inches, inclusive.....	7.50
	Entire length, 15 inches; diameter of blank end, 2 1-2 inches.	
No. 6.	Holds 3 1-16 to 4 inches, inclusive.....	14.00
	Entire length, 18 inches; diameter of blank end, 3 inches.	



D 155. No. 100 A.

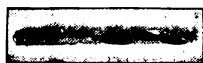
No. 1 with Shank fitted to No. 2 or 3 S'ket...	\$2.00
No. 2 with Shank fitted to No. 3 Socket...	2.50
No. 2 with Shank fitted to No. 4 Socket...	3.20
No. 3 with Shank fitted to No. 4 Socket...	3.20
No. 4 with Shank fitted to No. 5 Socket...	4.80
No. 5 with Shank fitted to No. 6 Socket...	12.00



D 156. No. 100 B.

No. 1 fitted to No. 2 or 3 Socket.....	\$1.80
No. 2 fitted to No. 3 Socket.....	2.40
No. 2 fitted to No. 4 Socket.....	3.00
No. 3 fitted to No. 4 Socket.....	3.00
No. 4 fitted to No. 5 Socket.....	4.40

Special Drills, with special size or length of shank or twist, made to order.



D 157.

DRILLS.

TWIST DRILLS—STRAIGHT SHANK.

JOBBER'S AND MACHINISTS' SETS.

Diameter.	Length.	Price per Doz.	Price Each.	Diameter.	Length.	Price per Doz.	Price Each.
1-16	2½	\$1.00	\$0.09	19-64	4¾	\$3.90	\$0.35
5-64	2½	1.10	.10	5-16	4¾	4.20	.37
3-32	2½	1.20	.11	21-64	4¾	4.50	.40
7-64	2½	1.30	.12	11-32	4¾	4.80	.42
1-8	3	1.45	.13	23-64	4¾	5.10	.45
9-64	3½	1.60	.15	3-8	5	5.40	.48
5-32	3¼	1.80	.16	25-64	5½	5.70	.50
11-64	3¾	2.00	.18	13-32	5¼	6.00	.53
3-16	3½	2.20	.20	27-64	5¾	6.40	.55
13-64	3¾	2.40	.21	7-16	5½	6.80	.59
7-32	3¾	2.65	.23	29-64	5¾	7.20	.63
15-64	3¾	2.90	.26	15-32	5¾	7.50	.65
1-4	4	3.15	.28	31-64	5¾	7.75	.67
17-64	4¾	3.40	.30	1-2	6	8.00	.70
9-32	4¼	3.65	.32	.....	...	....	...

N. B.—We keep Straight Shank Drills 17-32 to 1¼ inch by 32ds, same list as Taper Shank Drills of same sizes, and same length as Taper Shanks.

For sizes of Drills in decimals, see table in back of Catalogue.

D 158. STUBS' STEEL WIRE GAUGE DRILLS.

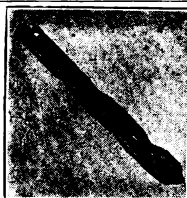
Nos. by Gauge.	Length.	Price per Doz.	Price Each.	Nos. by Gauge.	Length.	Price per Doz.	Price Each.
1 to 5	4	\$2.35	\$0.22	36 to 40	2½	\$1.25	\$0.12
6 to 10	3½	2.25	.21	41 to 45	2¼	1.10	.10
11 to 15	3½	2.10	.20	46 to 50	2½	.95	.09
16 to 20	3¼	1.95	.19	51 to 60	1¾	.95	.09
21 to 25	3½	1.75	.17	61 to 70	1½	.90	.08
26 to 30	2½	1.55	.15	71 to 80	1½ to ¾	1.00	.09
31 to 35	2½	1.40	.14	.....	.....	....	...

For speed of Drills, see table in back of Catalogue.

D 159. LETTER SIZE DRILLS.

Diameter.	Price per Dozen.	Price Each.	Decimals of 1 in.	Length.	Diameter.	Price per Dozen.	Price Each.	Decimals of 1 in.	Length.
A 1½ in.	\$2.90	\$0.26	.234	3½	N	\$4.20	\$0.37	.32	4¼
B	3.00	.27	.238	3½	O ½ in.	4.30	.38	.316	4¼
C	3.10	.28	.242	3½	P ¾ in.	4.40	.39	.323	4¾
D	3.20	.29	.246	3½	Q	4.60	.40	.332	4¾
E ¼ in.	3.30	.30	.250	3½	R ¼ in.	4.80	.42	.339	4¾
F	3.40	.30	.257	4¼	S	5.00	.44	.348	4¾
G	3.50	.31	.261	4¼	T ¾ in.	5.20	.45	.358	4¾
H ¼ in.	3.60	.32	.266	4¼	U	5.40	.47	.368	5
I	3.70	.33	.272	4¼	V ¾ in.	5.60	.49	.377	5
J	3.80	.34	.277	4¼	W ¾ in.	5.80	.51	.386	5½
K ½ in.	3.90	.35	.281	4¼	X	6.00	.53	.397	5¼
L	4.00	.36	.290	4¼	Y ¾ in.	6.40	.55	.404	5¼
M ¾ in.	4.10	.36	.295	4¼	Z	6.80	.59	.413	5¾

For very exact work, a gauge plainly marked should accompany an order.



D 160.

CENTER DRILLS.

Diameter.	Price per Dozen.	Length.	Diameter.	Price per Dozen.	Length.
1-16	\$0.80	1	9-64	\$1.35	1½
5-64	.90	1	5-32	1.50	1½
3-32	1.10	1½	11-64	1.70	1½
7-64	1.20	1½	3-16	1.90	1½
1-8	1.25	1½	13-64	2.10	1½

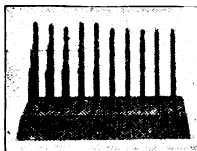
Straight-way Straight Shank Drills, same list as above.

See back of book for Table of Sizes in Decimals.

D 161.

TWIST DRILLS.

PRICES OF DRILLS, PER SET.



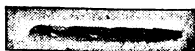
No. 1.	Set of Taper Shank Drills, $\frac{1}{4}$ to 1 in. varying by 16ths.....	\$20.00
" 2.	Set of Taper Shank Drills, $\frac{3}{8}$ to $1\frac{1}{4}$ in. varying by 16ths.....	34.50
" 3.	Set of Taper Shank Drills, $\frac{3}{8}$ to $\frac{1}{2}$ in. by 32ds, 13-16 to $1\frac{1}{4}$ by 16ths...	42.00
" 4.	Set of Taper Shank Drills, $\frac{3}{8}$ to $\frac{1}{2}$ in. by 32ds, 13-16 to $1\frac{1}{2}$ in. by 16ths, \$64.00; 19-16 to 2 in. by 16ths, \$67.	131.00
No. 5.	Set Drills, Straight Shanks, 1-16 to $\frac{1}{2}$ in. by 64ths, mounted....	10.00
" 6.	" " 1-16 to $\frac{1}{2}$ in. by 32ds, mounted.....	5.40
" 7.	" " from 60 to $\frac{3}{8}$ in., mounted.....	9.90
" 8.	" " Steel Wire Gauge, from No. 1 to No. 60, mounted....	8.10
" 9.	Half Set Drills, alternate Nos. from 1 to 59, mounted.....	4.30
" 10.	Jewelers' Set of 36 Drills, No. 30 ($\frac{1}{8}$ in.) to No. 65, Steel Wire Gauge, mounted in a Mahogany case with cap.....	4.25
" 11.	Set of Taper Shank Drills, $\frac{3}{8}$ to $1\frac{1}{2}$ in. by 32ds.....	\$107.50
	1 17-32 to 2 in. by 32ds.....	132.50
" 12.	Set Bit Stock Drills, 1-16 to $\frac{1}{4}$ by 32ds, 5-16 to $\frac{3}{8}$ by 16ths, boxed.	240.00
		2.60



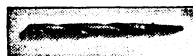
D 162. JEWELERS' DRILL SETS IN MAHOGANY CASE.

Price: For Case and 36 Drills, No. 30 ($\frac{1}{8}$ in.) to No. 65 Steel Wire Gauge..... \$4.25

BIT STOCK DRILLS, FOR METAL OR WOOD.



D 163.



D 164.

Helmet Oil
Lubricates
Everything.

Diameter.	Per Doz.	Price Each.	Diameter.	Per Doz.	Price Each.
1-16 inch.	\$1.50	\$0.14	5-16 inch.	\$5.40	\$0.48
3-32 "	1.65	.16	11-32 "	6.30	.54
1-8 "	2.10	.20	3-8 "	7.20	.62
5-32 "	2.60	.24	13-32 "	8.00	.68
3-16 "	3.10	.29	7-16 "	8.80	.75
7-32 "	3.60	.33	15-32 "	9.60	.82
1-4 "	4.10	.38	1-2 "	10.30	.87
9-32 "	4.70	.43	17-32 "	11.00	.92

Price per set, 1-16 to $\frac{1}{4}$ by 32ds, $\frac{1}{4}$ to $\frac{3}{8}$ by 16ths, boxed.....\$2.60

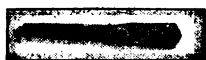
Our Bit Stock Drills will fit any brace in the market, and will drill Steel, Iron or other Metals, as well as wood. They are not injured by contact with screws or nails, and will bore any kind of Wood without splitting it.



D 165. TAPER SQUARE SHANK DRILLS FITTING RATCHETS.

Price with Shanks, $\frac{5}{8}$ inch by $\frac{3}{8}$ inch and $1\frac{1}{2}$ inch long, and Shanks $\frac{3}{4}$ inch by $\frac{1}{2}$ inch by $1\frac{1}{4}$ inch long.

Diameter.	Price.	Length.	Diameter.	Price.	Length.
1-4 inch.	\$1.00	5 inch.	13-16 inch.	\$1.75	7 inch.
9-32 "	1.05	5 "	7-8 "	2.05	7 $\frac{1}{2}$ "
5-16 "	1.10	5 "	15-16 "	2.30	8 "
11-32 "	1.15	5 "	1 "	2.55	8 $\frac{1}{2}$ "
3-8 "	1.20	6 "	1 1-16 "	2.85	9 "
13-32 "	1.25	6 $\frac{1}{4}$ "	1 1-8 "	3.10	9 "
7-16 "	1.25	6 $\frac{1}{4}$ "	1 3-16 "	3.35	9 "
15-32 "	1.30	6 $\frac{1}{4}$ "	1 1-4 "	3.65	9 "
1-2 "	1.30	6 $\frac{1}{2}$ "	1 5-16 "	3.90	9 "
9-16 "	1.35	6 $\frac{1}{2}$ "	1 3-8 "	4.20	9 "
5-8 "	1.40	6 $\frac{1}{2}$ "	1 7-16 "	4.50	9 "
11-16 "	1.45	6 $\frac{1}{2}$ "	1 1-2 "	4.80	9 "
3-4 "	1.55	6 $\frac{1}{2}$ "	.....	....	...



D 166. FLAT DRILLS FOR PACKER RATCHET.

Size $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1 $1\frac{1}{8}$ $1\frac{1}{4}$ $1\frac{3}{8}$ $1\frac{1}{2}$ 6 inches long.
 Price40 .40 .40 .45 .45 .45 .50 .55 .60 .65 cents each.

D 167.

TAPER, OR STRAIGHT SHANK DRILL.

64TH SIZES, FOR REAMERS.

Parallel
Clamps
make good
Drilling Jigs



Straight shank 64th sizes under $\frac{1}{2}$ inch take jobbers straight shank list.

Diameter.	Length.	Price each.	Socket for Morse Taper.	Diameter.	Length.	Price each.	Socket for Morse Taper.
15-64	$6\frac{1}{8}$	\$0.60	No. 1. \$1.20.	59-64	$10\frac{3}{4}$	\$2.75	No. 3. \$2.50.
17-64	$6\frac{1}{4}$	.65		61-64	$10\frac{7}{8}$	2.90
19-64	$6\frac{3}{8}$	.70		63-64	11	3.00
21-64	$6\frac{1}{2}$	.75		1 1-64	$11\frac{1}{8}$	3.20
23-64	$6\frac{3}{4}$	.80		1 3-64	$11\frac{1}{4}$	3.40
25-64	7	.85		1 5-64	$11\frac{1}{2}$	3.60	
27-64	$7\frac{1}{4}$	.90		1 7-64	$11\frac{3}{8}$	3.80
29-64	$7\frac{1}{2}$	.95		1 9-64	$11\frac{1}{2}$	4.00
31-64	$7\frac{3}{4}$	1.00		1 11-64	12	4.20	
33-64	8	1.10		1 13-64	$12\frac{1}{8}$	4.40	
35-64	$8\frac{1}{4}$	1.20	No. 2. \$1.80.	1 15-64	$12\frac{1}{2}$	4.50	No. 4. \$4.00.
37-64	$8\frac{1}{2}$	1.30		1 17-64	$14\frac{1}{8}$	4.65	
39-64	$8\frac{3}{4}$	1.40		1 19-64	$14\frac{1}{4}$	4.80	
41-64	9	1.50		1 21-64	$14\frac{3}{8}$	5.00	
43-64	$9\frac{1}{4}$	1.60		1 23-64	$14\frac{1}{2}$	5.20	
45-64	$9\frac{1}{2}$	1.70		1 25-64	$14\frac{3}{4}$	5.40	
47-64	$9\frac{3}{4}$	1.85		1 27-64	$14\frac{7}{8}$	5.60	
49-64	$9\frac{7}{8}$	2.00		1 29-64	$14\frac{7}{8}$	5.80	
51-64	10	2.15		1 31-64	15	6.00	
53-64	$10\frac{1}{4}$	2.30		1 33-64	$15\frac{1}{8}$	6.30	
55-64	$10\frac{1}{2}$	2.45		1 35-64	$15\frac{1}{4}$	6.60	
57-64	$10\frac{3}{8}$	2.60		1 37-64	$15\frac{3}{8}$	6.90	

DRILLS FITTING BLACKSMITHS' DRILL PRESSES.

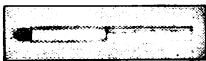


D 168. Prentice.



D 169. Coes.

Diam., Inches.	SHANKS $\frac{1}{2}$ IN. DIAMETER.		SHANKS 41-64 IN. DIAM.		Diam., Inches.	SHANKS $\frac{1}{2}$ IN. DIAMETER.		SHANKS 41-64 IN. DIAM.	
	Length.	Each.	Length.	Each.		Length.	Each.	Length.	Each.
1-8	$5\frac{1}{8}$	\$0.45	$4\frac{7}{8}$	\$0.55	27-32	$10\frac{1}{4}$	\$2.30	6	\$1.40
5-32	$5\frac{3}{8}$	.45	5	.60	7-8	$10\frac{1}{2}$	2.45	6	1.45
3-16	$5\frac{3}{8}$	.50	5	.60	29-32	$10\frac{5}{8}$	2.60	6	1.55
7-32	$5\frac{3}{8}$	.55	6	.65	15-16	$10\frac{3}{4}$	2.75	6	1.60
1-4	$6\frac{1}{8}$	.60	6	.70	31-32	$10\frac{7}{8}$	2.90	6	1.70
9-32	$6\frac{1}{4}$	.65	6	.75	1	11	3.00	6	1.80
5-16	$6\frac{3}{8}$	.70	6	.75	1 1-32	$11\frac{1}{8}$	3.20	6	1.90
11-32	$6\frac{1}{2}$	.75	6	.80	1 1-16	$11\frac{1}{4}$	3.40	6	2.00
3-8	$6\frac{3}{4}$	.80	6	.85	1 3-32	$11\frac{1}{2}$	3.60	6	2.10
13-32	7	.85	6	.90	1 1-8	$11\frac{3}{4}$	3.80	6	2.20
7-16	$7\frac{1}{4}$	.90	6	.90	1 5-32	$11\frac{7}{8}$	4.00	6	2.25
15-32	$7\frac{1}{2}$	.95	6	.95	1 3-16	12	4.20	6	2.30
1-2	$7\frac{3}{4}$	1.00	6	.95	1 7-32	$12\frac{1}{8}$	4.40	6	2.35
17-32	8	1.10	6	1.00	1 1-4	$12\frac{1}{4}$	4.50	6	2.40
9-16	$8\frac{1}{4}$	1.20	6	1.00	1 9-32	$12\frac{1}{2}$	4.65	6	2.50
19-32	$8\frac{1}{2}$	1.30	6	1.05	1 5-16	$12\frac{3}{8}$	4.80	6	2.60
5-8	$8\frac{3}{4}$	1.40	6	1.05	1 11-32	$12\frac{5}{8}$	5.00	6	2.70
21-32	9	1.50	6	1.10	1 3-8	$12\frac{1}{2}$	5.20	6	2.80
11-16	$9\frac{1}{4}$	1.60	6	1.15	1 13-32	$12\frac{3}{4}$	5.40	6	2.90
23-32	$9\frac{1}{2}$	1.70	6	1.20	1 7-16	$12\frac{7}{8}$	5.60	6	3.00
3-4	$9\frac{3}{4}$	1.85	6	1.25	1 15-16	$12\frac{7}{8}$	5.80	6	3.10
25-32	$9\frac{7}{8}$	2.00	6	1.30	1 1-2	$12\frac{7}{8}$	6.00	6	3.20
13-16	10	2.15	6	1.35					



D 170.

SOLID REAMERS.

JOBBER'S SET.

Diameter, Inches.	Price Each.	Full Length.	Length, Flutes.	Diameter, Inches.	Price Each.	Full Length.	Length, Flutes.
1-8	\$1.00	3	1½	1 11-32	\$ 5.40	12½	6½
5-32	1.10	3¼	1⅝	1 3-8	5.60	12⅝	6⅝
3-16	1.20	3½	1¾	1 13-32	5.80	12¾	6¾
7-32	1.30	3¾	1⅞	1 7-16	6.00	12⅞	6⅞
1-4	1.40	4	2	1 15-32	6.20	12⅞	6⅞
9-32	1.45	4¼	2⅛	1 1-2	6.40	13	6⅞
5-16	1.50	4½	2¼	1 17-32	6.60	13	6⅞
11-32	1.55	4¾	2⅜	1 9-16	6.80	13	6⅞
3-8	1.60	5	2½	1 19-32	7.00	13	6⅞
13-32	1.70	5¼	2⅝	1 5-8	7.20	13	6⅞
7-16	1.75	5½	2¾	1 21-32	7.40	13½	6¾
15-32	1.85	5¾	2⅞	1 11-16	7.60	13½	6¾
1-2	1.90	6	3	1 23-32	7.80	13½	6¾
17-32	1.95	6¼	3⅛	1 3-4	8.00	13½	6¾
9-16	2.00	6½	3¼	1 25-32	8.20	13½	6¾
19-32	2.10	6¾	3⅜	1 13-16	8.40	13½	6¾
5-8	2.20	7	3½	1 27-32	8.60	13½	6¾
21-32	2.30	7¼	3⅝	1 7-8	8.80	14	7
11-16	2.40	7½	3¾	1 29-32	9.00	14	7
23-32	2.50	8⅞	4⅞	1 15-16	9.20	14	7
3-4	2.60	8¾	4⅞	1 31-32	9.40	14	7
25-32	2.70	8¾	4¾	2	9.60	14	7
13-16	2.80	9⅞	4¾	2 1-16	10.00	14½	7¼
27-32	2.95	9¾	4⅞	2 1-8	10.40	14½	7¼
7-8	3.10	9½	4¾	2 3-16	10.80	15	7½
29-32	3.25	10¾	5¾	2 1-4	11.30	15	7½
15-16	3.40	10¾	5⅞	2 5-16	11.80	15	7½
31-32	3.55	10¾	5¾	2 3-8	12.30	15	7½
1	3.70	10¾	5⅞	2 7-16	12.80	15½	7¾
1 1-32	3.85	11⅞	5¾	2 1-2	13.40	15½	7¾
1 1-16	4.00	11¼	5⅞	2 9-16	14.00	15½	7¾
1 3-32	4.15	11⅞	5¾	2 5-8	14.60	16	8
1 1-8	4.30	11⅞	5⅞	2 11-16	15.40	16	8
1 5-32	4.45	11¾	5¾	2 3-4	16.20	16	8
1 3-16	4.60	12	6	2 13-16	17.00	16½	8¼
1 7-32	4.75	12⅞	6⅞	2 7-8	17.80	16½	8¼
1 1-4	4.90	12¼	6⅞	2 15-16	18.60	16½	8¼
1 9-32	5.05	12¼	6⅞	3	19.40	16½	8¼
1 5-16	5.20	12⅞	6¾	.....	.....	.....	.....

Reamers of any style, size or length, made to order. If for Brass, please so advise. Flutes straight or spiral, as desired.

JOBBER'S REAMERS.

PRICES OF JOBBER'S REAMERS PER SET.



D 171.

Set, ¼ to 1 inch diameter, by 16ths	\$ 30.00
Set, ¼ to 1¼ inch diameter, by 16ths	48.00
Set, ¼ to 1½ inch diameter, by 16ths	70.00
Set, ¼ to 2 inch diameter, by 16ths	135.00
Set, ¼ to 1 inch diameter, by 32ds	57.50
Set, ¼ to 1¼ inch diameter, by 32ds	92.00
Set, ¼ to 1½ inch diameter, by 32ds	137.00
Set, ¼ to 2 inch diameter, by 32ds	265.00

D 172.

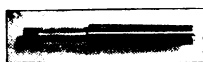
HAND
AND BRACE
REAMER.

Each.

5 inch Reams to ⅝ inch Hole..	\$0.75
7 inch Reams to ¾ inch Hole..	1.00

Milling Cutters
made for
Bicycle Work.





D 173.

MORSE TAPER
REAMERS.

No. 0.. \$1.60

No. 1.. 2.00

No. 2.. 2.60

No. 3.. 3.40

No. 4.. \$ 4.20

No. 5.. 6.60

No. 6.. 12.00

DIMENSIONS MORSE TAPER REAMERS.

No.	Full Length of Flute.	Taper.	No.	Full Length of Flute.	Taper.
0,	3 $\frac{3}{4}$ in.	2 $\frac{1}{4}$ in.	3,	8 $\frac{1}{4}$ in.	5 in.
1,	5 $\frac{7}{8}$ "	3 $\frac{1}{2}$ "	4,	9 "	5 $\frac{1}{2}$ "
2,	7 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	5,	9 $\frac{7}{8}$ "	5 $\frac{3}{8}$ "
			6,	12 "	9 "
					1.025 by .775
					1.303 " 1.021
					1.786 " 1.480
					2.597 " 2.129



D 174. ROSE CHUCKING REAMERS.

Diameter, Inches.	Price each.	Full Length.	Length, Flutes.	Diameter, Inches.	Price each.	Full Length.	Length, Flutes.
1-4	\$.80	6	1 $\frac{1}{2}$	1 7-32	\$2.65	11	2 $\frac{7}{8}$
9-32	.85	6	1 $\frac{1}{2}$	1 1-4	2.70	11 $\frac{1}{2}$	3
5-16	.90	6	1 $\frac{1}{2}$	1 5-16	2.85	11 $\frac{1}{2}$	3
11-32	.95	6	1 $\frac{1}{2}$	1 3-8	3.00	12	3 $\frac{1}{4}$
3-8	1.00	7	1 $\frac{3}{4}$	1 7-16	3.15	12	3 $\frac{1}{4}$
13-32	1.05	7	1 $\frac{3}{4}$	1 1-2	3.30	12 $\frac{1}{2}$	3 $\frac{1}{2}$
7-16	1.10	7	1 $\frac{3}{4}$	1 9-16	3.45	12 $\frac{1}{2}$	3 $\frac{1}{2}$
15-32	1.15	7	1 $\frac{3}{4}$	1 5-8	3.60	13	3 $\frac{3}{4}$
1-2	1.20	8	2	1 11-16	3.75	13	3 $\frac{3}{4}$
17-32	1.25	8	2	1 3-4	3.90	13 $\frac{1}{2}$	4
9-16	1.30	8	2	1 13-16	4.05	13 $\frac{1}{2}$	4
19-32	1.35	8	2	1 7-8	4.20	14	4 $\frac{1}{4}$
5-8	1.40	9	2 $\frac{1}{4}$	1 15-16	4.40	14	4 $\frac{1}{4}$
21-32	1.45	9	2 $\frac{1}{4}$	2	4.60	14	4 $\frac{1}{4}$
11-16	1.50	9	2 $\frac{1}{4}$	2 1-16	4.90	14 $\frac{1}{2}$	4 $\frac{1}{2}$
23-32	1.55	9	2 $\frac{1}{4}$	2 1-8	5.20	14 $\frac{1}{2}$	4 $\frac{1}{2}$
3-4	1.60	9 $\frac{1}{2}$	2 $\frac{1}{2}$	2 3-16	5.50	14 $\frac{1}{2}$	4 $\frac{1}{2}$
25-32	1.65	9 $\frac{1}{2}$	2 $\frac{1}{2}$	2 1-4	5.80	14 $\frac{1}{2}$	4 $\frac{1}{2}$
13-16	1.70	9 $\frac{1}{2}$	2 $\frac{1}{2}$	2 5-16	6.10	15	4 $\frac{3}{4}$
27-32	1.75	9 $\frac{1}{2}$	2 $\frac{1}{2}$	2 3-8	6.40	15	4 $\frac{3}{4}$
7-8	1.80	10	2 $\frac{5}{8}$	2 7-16	6.80	15	4 $\frac{3}{4}$
29-32	1.90	10	2 $\frac{5}{8}$	2 1-2	7.20	15	4 $\frac{3}{4}$
15-16	1.95	10	2 $\frac{5}{8}$	2 9-16	7.50	15 $\frac{1}{2}$	5
31-32	2.05	10	2 $\frac{5}{8}$	2 5-8	7.80	15 $\frac{1}{2}$	5
1	2.10	10 $\frac{1}{2}$	2 $\frac{3}{4}$	2 11-16	8.10	15 $\frac{1}{2}$	5
1 1-32	2.20	10 $\frac{1}{2}$	2 $\frac{3}{4}$	2 3-4	8.40	15 $\frac{1}{2}$	5
1 1-16	2.25	10 $\frac{1}{2}$	2 $\frac{3}{4}$	2 13-16	8.80	16	5 $\frac{1}{4}$
1 3-32	2.35	10 $\frac{1}{2}$	2 $\frac{3}{4}$	2 7-8	9.20	16	5 $\frac{1}{4}$
1 1-8	2.40	11	2 $\frac{7}{8}$	2 15-16	9.60	16	5 $\frac{1}{4}$
1 5-32	2.50	11	2 $\frac{7}{8}$	3	10.00	16	5 $\frac{1}{4}$
1 3-16	2.55	11	2 $\frac{7}{8}$				

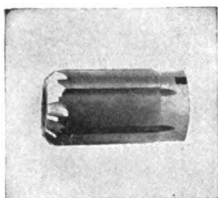


D 175. FLUTED CHUCKING REAMERS.

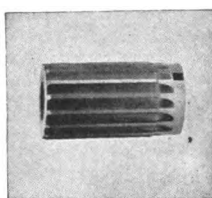
These Reamers are slightly tapered on end of Flutes.

Diameter, Inches.	Price Each.	Full Length.	Length Flutes.	Diameter, Inches.	Price Each.	Full Length.	Length Flutes.
1-4 less .005	\$.90	6	$\frac{7}{8}$	1 1-4 less .005	\$2.90	11 $\frac{1}{2}$	1 $\frac{3}{8}$
9-32 less .005	.95	6	$\frac{7}{8}$	1 5-16 less .005	3.05	11 $\frac{1}{2}$	1 $\frac{3}{8}$
5-16 less .005	1.00	6	$\frac{7}{8}$	1 3-8 less .005	3.20	12	2
11-32 less .005	1.05	6	$\frac{7}{8}$	1 7-16 less .005	3.35	12	2
3-8 less .005	1.10	7	1	1 1-2 less .005	3.50	12 $\frac{1}{2}$	2 $\frac{1}{8}$
13-32 less .005	1.15	7	1	1 9-16 less .005	3.65	12 $\frac{1}{2}$	2 $\frac{1}{8}$
7-16 less .005	1.20	7	1	1 5-8 less .005	3.80	13	2 $\frac{1}{4}$
15-32 less .005	1.25	7	1	1 11-16 less .005	4.00	13	2 $\frac{1}{4}$
1-2 less .005	1.30	8	1 $\frac{1}{8}$	1 3-4 less .005	4.20	13 $\frac{1}{2}$	2 $\frac{3}{8}$
17-32 less .005	1.35	8	1 $\frac{1}{8}$	1 13-16 less .005	4.40	13 $\frac{1}{2}$	2 $\frac{3}{8}$
9-16 less .005	1.40	8	1 $\frac{1}{8}$	1 7-8 less .005	4.60	14	2 $\frac{1}{2}$
19-32 less .005	1.45	8	1 $\frac{1}{8}$	1 15-16 less .005	4.80	14	2 $\frac{1}{2}$
5-8 less .005	1.50	9	1 $\frac{1}{4}$	2 less .005	5.00	14	2 $\frac{1}{2}$
21-32 less .005	1.55	9	1 $\frac{1}{4}$	2 1-16 less .005	5.30	14 $\frac{1}{2}$	2 $\frac{3}{4}$
11-16 less .005	1.60	9	1 $\frac{1}{4}$	2 1-8 less .005	5.60	14 $\frac{1}{2}$	2 $\frac{3}{4}$
23-32 less .005	1.65	9	1 $\frac{1}{4}$	2 3-16 less .005	5.90	14 $\frac{1}{2}$	2 $\frac{3}{4}$
3-4 less .005	1.70	9 $\frac{1}{2}$	1 $\frac{3}{8}$	2 1-4 less .005	6.20	14 $\frac{1}{2}$	2 $\frac{3}{4}$
25-32 less .005	1.80	9 $\frac{1}{2}$	1 $\frac{3}{8}$	2 5-16 less .005	6.50	15	3
13-16 less .005	1.85	9 $\frac{1}{2}$	1 $\frac{3}{8}$	2 3-8 less .005	6.80	15	3
27-32 less .005	1.90	9 $\frac{1}{2}$	1 $\frac{3}{8}$	2 7-16 less .005	7.10	15	3
7-8 less .005	2.00	10	1 $\frac{1}{2}$	2 1-2 less .005	7.40	15	3
29-32 less .005	2.10	10	1 $\frac{1}{2}$	2 9-16 less .005	7.70	15 $\frac{1}{2}$	3 $\frac{1}{4}$
15-16 less .005	2.15	10	1 $\frac{1}{2}$	2 5-8 less .005	8.00	15 $\frac{1}{2}$	3 $\frac{1}{4}$
31-32 less .005	2.25	10	1 $\frac{1}{2}$	2 11-16 less .005	8.35	15 $\frac{1}{2}$	3 $\frac{1}{4}$
1 less .005	2.30	10 $\frac{1}{2}$	1 $\frac{3}{8}$	2 3-4 less .005	8.70	15 $\frac{1}{2}$	3 $\frac{1}{4}$
1 1-2 less .005	2.40	10 $\frac{1}{2}$	1 $\frac{3}{8}$	2 13-16 less .005	9.00	16	3 $\frac{1}{2}$
1 1-16 less .005	2.45	10 $\frac{1}{2}$	1 $\frac{3}{8}$	2 7-8 less .005	9.35	16	3 $\frac{1}{2}$
1 3-32 less .005	2.55	10 $\frac{1}{2}$	1 $\frac{3}{8}$	2 15-16 less .005	9.70	16	3 $\frac{1}{2}$
1 1-8 less .005	2.60	11	1 $\frac{3}{4}$	3 less .005	10.00	16	3 $\frac{1}{2}$
1 5-32 less .005	2.70	11	1 $\frac{3}{4}$				
1 3-16 less .005	2.75	11	1 $\frac{3}{4}$				
1 7-32 less .005	2.85	11	1 $\frac{3}{4}$				

The above Reamers are finished .005 of an inch under Standard.



D 176. Rose.

SHELL
REAMERS.

D 177. Fluted.

The Badge
Die Stock
Always Cut
the Same
Size.

Diameter, Inches.	Price Each.	Length, Inches.	Size Hole.	Diameter, Inches.	Price Each.	Length, Inches.	Size Hole.
1-4	\$1.10	1 1/2	1/8	2 11-16	\$ 7.60	4	1 1/2
5-16	1.10	1 1/2	1/8	2 3-4	8.00	4	1 1/2
3-8	1.20	1 3/4	3-16	2 13-16	8.40	4	1 1/2
7-16	1.30	1 3/4	3-16	2 7-8	8.80	4	1 1/2
1-2	1.40	2	1/4	2 15-16	9.20	4	1 1/2
9-16	1.50	2	1/4	3	9.60	4	1 1/2
5-8	1.60	2 1/4	3/8	3 1-16	9.90	4 1/2	1 3/4
11-16	1.60	2 1/4	3/8	3 1-8	10.20	4 1/2	1 3/4
3-4	1.60	2 1/2	1/2	3 3-16	10.60	4 1/2	1 3/4
13-16	1.60	2 1/2	1/2	3 1-4	11.00	4 1/2	1 3/4
7-8	1.70	2 1/2	1/2	3 5-16	11.50	4 1/2	1 3/4
15-16	1.70	2 1/2	1/2	3 3-8	12.00	4 1/2	1 3/4
1	1.80	2 3/4	5/8	3 7-16	12.50	4 1/2	1 3/4
1 1-16	1.80	2 3/4	5/8	3 1-2	13.00	4 1/2	1 3/4
1 1-8	1.90	2 3/4	5/8	3 9-16	13.50	5	2
1 3-16	2.00	2 3/4	5/8	3 5-8	14.00	5	2
1 1-4	2.20	2 3/4	5/8	3 11-16	14.50	5	2
1 5-16	2.40	3	3/4	3 3-4	15.00	5	2
1 3-8	2.60	3	3/4	3 13-16	15.50	5	2
1 7-16	2.80	3	3/4	3 7-8	16.00	5	2
1 1-2	3.00	3	3/4	3 15-16	17.00	5	2
1 9-16	3.20	3	3/4	4	18.00	5	2
1 5-8	3.50	3	3/4	4 1-16	18.30	5 1/2	2 1/4
1 11-16	3.80	3 1/2	1	4 1-8	18.60	5 1/2	2 1/4
1 3-4	4.10	3 1/2	1	4 3-16	19.00	5 1/2	2 1/4
1 13-16	4.40	3 1/2	1	4 1-4	19.40	5 1/2	2 1/4
1 7-8	4.70	3 1/2	1	4 5-16	19.80	5 1/2	2 1/4
1 15-16	5.00	3 1/2	1	4 3-8	20.20	5 1/2	2 1/4
2	5.20	3 1/2	1	4 7-16	20.60	5 1/2	2 1/4
2 1-16	5.40	3 3/4	1 1/4	4 1-2	21.00	5 1/2	2 1/4
2 1-8	5.60	3 3/4	1 1/4	4 9-16	21.60	6	2 1/2
2 3-16	5.80	3 3/4	1 1/4	4 5-8	22.20	6	2 1/2
2 1-4	6.00	3 3/4	1 1/4	4 11-16	22.80	6	2 1/2
2 5-16	6.20	3 3/4	1 1/4	4 3-4	23.40	6	2 1/2
2 3-8	6.40	3 3/4	1 1/4	4 13-16	24.00	6	2 1/2
2 7-16	6.60	3 3/4	1 1/4	4 7-8	24.60	6	2 1/2
2 1-2	6.80	3 3/4	1 1/4	4 15-16	25.20	6	2 1/2
2 9-16	7.00	4	1 1/2	5	26.00	6	2 1/2
2 5-8	7.30	4	1 1/2	.....	.....	...	...

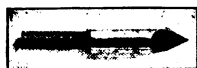
D 178.

ARBORS FOR SHELL REAMERS.

No.	Price Each.	Fitting Sizes, Inches.	Full Length.	No.	Price Each.	Fitting Sizes, Inches.	Full Length.
1	\$1.20	1-4 to 5-16	6	8	\$ 2.70	1 11-16 to 2	12
2	1.40	3-8 to 7-16	7	9	3.00	2 1-16 to 2 1-2	13
3	1.60	1-2 to 9-16	8	10	3.40	2 9-16 to 3	14
4	1.80	5-8 to 11-16	9	11	5.00	3 1-16 to 3 1-2	15
5	2.00	3-4 to 15-16	9 1/2	12	7.00	3 9-16 to 4	16
6	2.20	1 1-4 to 1 1-4	10	13	9.00	4 1-16 to 4 1-2	17
7	2.40	1 5-16 to 1 5-8	11	14	12.00	4 9-16 to 5	18

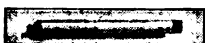
NEW CENTER REAMER.

D 179.



This tool will be appreciated by every machinist. It is accurately made of the best steel and of the most approved form.

Size Shank.	Size Cut.	Price Each.	Per Dozen.
1/4 inch.	3/8 inch.	\$0.40	\$4.50
3/8 "	1/2 "	.50	5.75
1/2 "	3/4 "	.60	6.75

**D 180. ADJUSTABLE REAMER.**

Diameter, Inches.	Length of Flute	Length over all.	Price Each	Diameter, Inches.	Length of Flute	Length over all.	Price Each.
1-4	1 $\frac{3}{4}$	3 $\frac{3}{4}$	\$1.75	1 5-16	5 $\frac{3}{4}$	10 $\frac{1}{8}$	\$6.80
5-16	1 $\frac{1}{8}$	4	1.85	1 3-8	5 $\frac{1}{2}$	10 $\frac{3}{8}$	7.00
3-8	2 $\frac{1}{8}$	4 $\frac{1}{4}$	2.00	1 7-16	5 15-16	10 $\frac{5}{8}$	7.50
7-16	2 $\frac{1}{4}$	4 $\frac{1}{2}$	2.15	1 1-2	6	10 $\frac{3}{4}$	8.00
1-2	2 $\frac{3}{8}$	5	2.35	1 9-16	6 $\frac{1}{8}$	11 $\frac{1}{8}$	8.50
9-16	2 $\frac{3}{4}$	5 $\frac{1}{2}$	2.50	1 5-8	6 $\frac{1}{4}$	11 $\frac{1}{4}$	9.00
5-8	3 $\frac{1}{8}$	5 $\frac{3}{4}$	2.75	1 11-16	6 $\frac{3}{8}$	11 $\frac{3}{8}$	9.30
11-16	3 $\frac{1}{4}$	6 $\frac{1}{4}$	3.00	1 3-4	6 $\frac{1}{2}$	11 $\frac{1}{2}$	9.60
3-4	3 $\frac{3}{8}$	6 $\frac{3}{8}$	3.25	1 13-16	6 $\frac{5}{8}$	11 $\frac{3}{4}$	9.90
13-16	4	7 $\frac{1}{8}$	3.50	1 7-8	6 $\frac{3}{4}$	11 $\frac{1}{2}$	10.20
7-8	4 5-16	7 9-16	4.15	1 15-16	6 $\frac{7}{8}$	12	10.50
15-16	4 9-16	8 1-16	4.25	2	7	12 $\frac{1}{4}$	10.80
1	4 $\frac{1}{8}$	8 $\frac{1}{8}$	4.60	2 1-8	7 $\frac{1}{8}$	12 $\frac{3}{8}$	11.40
1 1-16	5 $\frac{1}{8}$	9	5.00	2 1-4	7 $\frac{1}{4}$	13	11.90
1 1-8	5 $\frac{1}{4}$	9 $\frac{1}{4}$	5.35	2 3-8	7 $\frac{3}{8}$	13 $\frac{1}{2}$	12.40
1 3-16	5 $\frac{3}{8}$	9 9-16	5.70	2 1-2	7 $\frac{1}{2}$	14	13.00
1 1-4	5 $\frac{1}{2}$	9 $\frac{1}{2}$	6.10				

D 181. LOCOMOTIVE REAMER.

The following list embraces Reamers tapering 3-32 inch per foot.

Diameter at End, Inches.	Price Each.	Length of Flutes.	Total Length, Inches.	Diameter at End, Inches.	Price Each.	Length of Flutes.	Total Length, Inches.
1-4	\$2.20	4 in.	5 5-16	15-16	\$5.10	9 in.	11 1-4
9-32	2.20	4 "	5 5-16	1	5.40	9 "	11 1-4
5-16	2.25	4 "	5 5-16	1 1-16	5.70	9 "	11 1-4
11-32	2.25	4 "	5 5-16	1 1-8	6.20	10 "	12 1-4
3-8	2.30	5 "	6 5-16	1 3-16	6.60	10 "	12 1-4
13-32	2.40	5 "	6 5-16	1 1-4	7.00	10 "	12 1-4
7-16	2.55	6 "	7 5-16	1 5-16	7.60	12 "	14 1-2
15-32	2.70	6 "	7 5-16	1 3-8	8.00	12 "	14 1-2
1-2	3.00	7 "	8 5-8	1 7-16	8.50	12 "	14 1-2
9-16	3.20	8 "	9 7-8	1 1-2	9.00	12 "	14 1-2
5-8	3.50	8 "	9 7-8	1 9-16	9.75	12 "	14 1-2
11-16	3.80	8 "	9 7-8	1 5-8	10.50	14 "	16 1-2
3-4	4.10	8 "	9 7-8	1 11-16	11.25	14 "	16 1-2
13-16	4.50	9 "	11 1-4	1 3-4	12.00	14 "	16 1-2
7-8	4.80	9 "	11 1-4				

Reamers of other taper per foot than as specified above, furnished as desired.

**D 182. LIGHTNING TAPER REAMERS.**

FOR BIT BRACE USE.

A set of these useful tools, one size running into another, enables a 3-16 inch hole to be enlarged to a 1 $\frac{1}{4}$ inch, if necessary. Each reamer leaves a true-cut hole.

1-4 inch....each, \$0.45	9-16 inch....each, \$0.80	7-8 inch....each, \$1.60
5-16 " " .50	5-8 " " .90	15-16 " " 1.80
3-8 " " .55	11-16 " " 1.05	1 " " 2.00
7-16 " " .60	3-4 " " 1.20	1 1-8 " " 2.25
1-2 " " .70	13-16 " " 1.40	1 1-4 " " 2.60

Set of 5 sizes, $\frac{1}{4}$ inch to $\frac{1}{2}$ inch.....In Case, \$3.00.....Without Case, \$2.80
Set of 9 sizes, $\frac{1}{4}$ inch to $\frac{3}{4}$ inch.....In Case, 7.25.....Without Case, 6.75

**D 183. STUBS' BROACHES, OR FIVE-SIDED REAMERS.**

Size of largest part.....	1-16	3-32	1-8	5-32	3-16	7-32	1-4
Number by Drill Gauge...	50	40	30	20	10	Length, 4 1-2	4 3-4
Price each.....	\$0.10	\$0.10	\$0.15	\$0.15	\$0.25		\$0.30
Size of Largest part.....	5-16	2 1-64	11-32	3-8		7-16	15-32
Length of Cutting part...	5	5 1-2	6	6 1-2		7	8
Price each.....	\$0.35	\$0.40	\$0.45	\$0.50		\$0.60	\$0.80

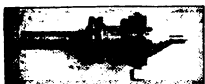


D 184. HARDENED AND GROUND STEEL MANDRELS.



The Mandrels are slightly tapered, and correspond in size to our Reamers, and will fit holes reamed by them.

Diameter, In.	Price Each.	Length, In.	Diameter, In.	Price Each.	Length, In.
1-4	\$.65	3 $\frac{3}{4}$	2 3-16	\$ 6.00	12
5-16	.75	4	2 1-4	6.50	12
3-8	.85	4 $\frac{1}{4}$	2 5-16	6.90	12
7-16	.95	4 $\frac{1}{2}$	2 3-8	7.40	12
1-2	1.05	5	2 7-16	7.90	12 $\frac{1}{2}$
9-16	1.15	5 $\frac{1}{4}$	2 1-2	8.40	12 $\frac{1}{2}$
5-8	1.25	5 $\frac{1}{2}$	2 9-16	8.90	12 $\frac{1}{2}$
11-16	1.35	5 $\frac{3}{4}$	2 5-8	9.40	12 $\frac{1}{2}$
3-4	1.45	6	2 11-16	9.90	13
13-16	1.55	6 $\frac{1}{4}$	2 3-4	10.50	13
7-8	1.70	6 $\frac{1}{2}$	2 13-16	11.00	13
15-16	1.85	6 $\frac{3}{4}$	2 7-8	11.50	13
1	2.00	7	2 15-16	12.00	13
1 1-16	2.10	7 $\frac{1}{4}$	3	12.50	13
1 1-8	2.20	7 $\frac{1}{2}$	3 1-16	13.00	14
1 3-16	2.30	7 $\frac{3}{4}$	3 1-8	13.40	14
1 1-4	2.45	8	3 3-16	13.80	14
1 5-16	2.60	8 $\frac{1}{4}$	3 1-4	14.10	14
1 3-8	2.75	8 $\frac{1}{2}$	3 5-16	14.40	15
1 7-16	2.90	8 $\frac{3}{4}$	3 3-8	14.70	15
1 1-2	3.10	9	3 7-16	15.00	15
1 9-16	3.30	9 $\frac{1}{4}$	3 1-2	15.30	15
1 5-8	3.50	9 $\frac{1}{2}$	3 9-16	15.60	16
1 11-16	3.70	9 $\frac{3}{4}$	3 5-8	15.90	16
1 3-4	3.90	10	3 11-16	16.20	16
1 13-16	4.10	10 $\frac{1}{4}$	3 3-4	16.50	16
1 7-8	4.35	10 $\frac{1}{2}$	3 13-16	16.80	17
1 15-16	4.60	10 $\frac{3}{4}$	3 7-8	17.20	17
2	4.80	11	3 15-16	17.60	17
2 1-16	5.15	11 $\frac{1}{2}$	4	18.00	17
2 1-8	5.60	11 $\frac{1}{2}$			



D 185. LIGHTNING COUNTERSINK AND DRILL COMBINED.

Hole clear through, exact size of Drill. Drill may be set according to depth wanted. The Countersink following the Drill, the job is finished at one operation, saving the adjusting of tools and work twice. The Countersinking Cutter is readily taken out to be ground, and is of ample length for wear.

Each tool carries only one size of drill. Supplied with shanks 1-2 inch diameter, for sizes 1-8 to 9-32 inch; with shanks 41-64 inch diameter for sizes 1-8 to 11-32 inch.

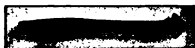
Price of Tools, without Drills, each \$1.50
Extra Countersinking Cutters..... .20



D 186.

D 186, D 187.

ROSE HEAD AND SNAIL COUNTERSINKS.



D 187.

Sizes..... 1-2 inch. 5-8 inch. 3-4 inch.
Price each... \$0.15 \$0.20 \$0.25

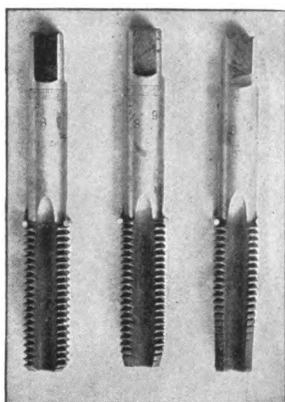


D 188. SHEPARDSON'S COUNTERSINK.

Made from the finest Tool Steel. Price each.. \$0.25

Special Taps, Reamers, Milling Cutters, made to order.



D 189. MACHINIST'S HAND TAPS—PATENT RELIEVED.**V AND FRANKLIN INSTITUTE SHAPE OF THREAD.**Unless advised to the contrary, we fill orders with **V** Threads.**Each Tap
Guaranteed.**

Bottoming. Plug. Taper.

We keep in stock the above 1-32 over-size, and can furnish 1.64 over, if desired.

When exact duplicates are wanted, orders should be accompanied by stub, with nut fitting same.

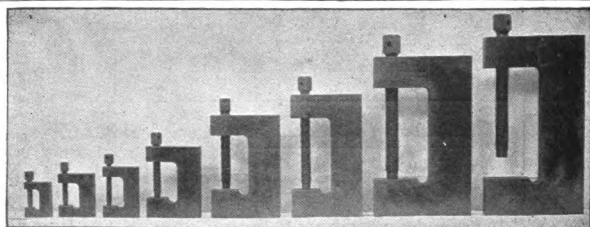
Taps ordered over-size, up to 1-32 of an inch, will be charged as regular sizes.

Hand Taps are sent even-size, unless over-size is specified.

Diameter, Inches.	No. of Threads to Inch.	Price Each.	Price Per Set.
1-4	16, 18 and 20	\$ 0.45	\$ 1.35
5-16	16 and 18	.50	1.50
3-8	14, 16 and 18	.55	1.65
7-16	14 and 16	.60	1.80
1-2	12, 13 and 14	.70	2.10
9-16	12 and 14	.80	2.40
5-8	10, 11 and 12	.90	2.70
11-16	11 and 12	1.05	3.15
3-4	10 and 12	1.20	3.60
13-16	10	1.40	4.20
7-8	9 and 10	1.60	4.80
15-16	9	1.80	5.40
1	8	2.00	6.00
1 1-8	7 and 8	2.25	6.75
1 1-4	7	2.60	7.80
1 3-8	6	3.00	9.00
1 1-2	6	3.50	10.50
1 5-8	5 and 5½	4.20	12.60
1 3-4	5	5.00	15.00
1 7-8	4½ and 5	5.80	17.40
2	4½	6.70	20.10
2 1-8	4½	8.00	24.00
2 1-4	4½	9.20	27.60
2 3-8	4½	10.50	31.50
2 1-2	4	11.50	34.50
2 5-8	4	13.00	39.00
2 3-4	4	14.00	42.00
2 7-8	4	15.50	46.50
3	3½	17.00	51.00
3 1-8	3½	18.75	56.25
3 1-4	3½	20.50	61.50
3 3-8	3½	22.00	66.00
3 1-2	3½	24.00	72.00
3 5-8	3½	26.00	78.00
3 3-4	3	28.50	85.50
3 7-8	3	30.00	90.00
4	3	32.50	97.50

D 190**MACHINIST'S HAND TAPS—SMALL SIZES.**

Diameter, Inches.	Standard No. of Threads to In.	Threads also Furnished.	Price Each.	Price Per Set.
1-16	72	60 and 64	\$0.35	\$1.05
5-64	72	56, 60 and 64	.35	1.05
3-32	56	48, 50 and 60	.35	1.05
7-64	56	48, 50 and 60	.35	1.05
1-8	40	32 and 36	.35	1.05
9-64	40	32 and 36	.35	1.05
5-32	32	36 and 40	.35	1.05
11-64	32	36 and 40	.35	1.05
3-16	24	22, 32 and 36	.45	1.35
13-64	24	22, 28, 32 and 36	.45	1.35
7-32	24	28, 32 and 36	.45	1.35
15-64	24	28, 32 and 36	.45	1.35
1-4	20	18, 22, 24, 26 and 32	.45	1.35
17-64	20	18, 22, 24, 26 and 32	.45	1.35





D 192. MACHINE SCREW TAPS.

Size of Screw Gauge	Approximate Size in Inches.	Standard No. of Threads to Inch.	Threads also Fur- nished.	PRICE.	
				Each.	Per Doz.
No. 1		56		\$0.35	
" 1½		56		.35	
" 2	5-64	56	48 and 64	.35	\$4.00
" 3		48	40 and 56	.35	4.00
" 4	7-64	36	32 and 40	.35	4.00
" 5		36	30, 32 and 40	.35	4.00
" 6	9-64	32	30, 36 and 40	.35	4.00
" 7		32	28 and 30	.35	4.00
" 8	5-32	32	24 and 30	.35	4.00
" 9		30	24, 28 and 32	.35	4.00
" 10	3-16	24	28, 30 and 32	.35	4.00
" 11		24	28 and 30	.35	4.00
" 12	7-32	24	20, 22 and 28	.35	4.00
" 13		22	20 and 24	.38	4.40
" 14	1-4	20	22 and 24	.38	4.40
" 15		20	18, 22 and 24	.38	4.40
" 16	17-64	18	16, 20 and 24	.38	4.40
" 17		18	16 and 20	.38	4.40
" 18	9-32	18	16 and 20	.38	4.40
" 19		18	16 and 20	.38	4.40
" 20	5-16	16	18 and 20	.45	5.30
" 22		16	18	.45	5.30
" 24	3-8	16	14 and 18	.45	5.30
" 26		16	14	.53	6.30
" 28		14	16	.53	6.30
" 30	7-16	14	16	.53	6.30

Less than six Taps of a size and thread will be charged as single Taps.
 Sizes and threads not on list will be considered special, and will be subject to special prices.



D 193. STOVE BOLT TAPS.

Size.	No. Threads.	Price Each.	Price per doz.	Size.	No. Threads.	Price Each.	Price per doz.
5-32	30	\$0.35	\$4.00	1-4	18	\$0.38	\$4.40
3-16	24	.35	4.00	5-16	18	.38	4.40
7-32	24	.35	4.00	3-8	18	.45	5.30



D 194. TAPPER TAPS.

Badger Die
Stocks for
Bicycle Use

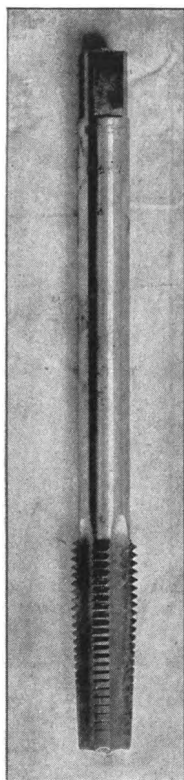
Sizes.	Number Threads to inch.	Whole Length.				Sizes.
		11 inches.	12 inches.	14 inches.	15 inches.	
1-4	16 18 20	\$0.70	\$0.75	\$0.70	\$0.90	1-4
5-16	16 18	.80	.85	.80	1.00	5-16
3-8	14 16	.90	.95	1.00	1.10	3-8
7-16	12 14 16	1.00	1.05	1.15	1.25	7-16
1-2	12 13 14	1.12	1.15	1.25	1.35	1-2
9-16	12 14	1.30	1.35	1.45	1.55	9-16
5-8	10 11 12	1.45	1.50	1.65	1.75	5-8
11-16	11 12	1.62	1.70	1.80	1.95	11-16
3-4	10	1.80	1.85	2.00	2.10	3-4
13-16	10	2.05	2.10	2.25	2.35	13-16
7-8	9	2.35	2.45	2.60	2.75	7-8
15-16	9	2.70	2.75	3.00	3.15	15-16
1	8	3.15	3.20	3.50	3.65	1
1 1-8	7	3.60	3.70	3.95	4.10	1 1-8
1 1-4	7	4.15	4.25	4.50	4.65	1 1-4
1 3-8	6	4.70	4.80	5.05	5.20	1 3-8
1 1-2	6	5.30	5.40	5.65	5.80	1 1-2

We will charge special prices for any other lengths or sizes, unless ordered in large quantities.

Specify form and number of thread wanted, and also whether exact or oversize.

D 195.

MACHINE OR NUT TAPS.—Taper or Plug.



Sizes.	Price Each.	No. Threads to Inch.	Whole Length.
3-16	\$ 0.60	24	4 1-2
1-4	.60	16, 18, 20	5
5-16	.70	16, 18	5 3-4
3-8	.80	14 , 16	6 1-2
7-16	.90	12, 14 , 16	7 1-4
1-2	1.00	12 , 13, 14	8
9-16	1.15	12 , 14	8 3-4
5-8	1.30	10, 11 , 12	9 1-2
11-16	1.45	11 , 12	10 1-4
3-4	1.60	10	10 1-4
13-16	1.80	10	11
7-8	2.10	9 , 10	11 1-16
15-16	2.40	9	11 11-16
1	2.80	8	12
1 1-8	3.20	7 , 8	12 5-8
1 1-4	3.70	7 , 8	13 1-4
1 3-8	4.20	6	14
1 1-2	4.70	6	15 1-2
1 5-8	5.30	5 , 5 1/2	16 1-4
1 3-4	6.00	5	17
1 7-8	6.80	4 1/2, 5	17 3-4
2	7.70	4 1/2, 5	18 1-2
2 1-8	9.00	4 1/2	18 1-2
2 1-4	10.20	4 1/2	18 1-2
2 3-8	11.50	4 1/2	18 1-2
2 1-2	12.50	4	19
2 5-8	14.00	4	19
2 3-4	15.00	4	19 1-2
2 7-8	16.50	4	19 1-2
3	18.00	3 1/2	21
3 1-8	19.75	3 1/2	21
3 1-4	21.50	3 1/2	21
3 3-8	23.00	3 1/2	21
3 1-2	25.00	3 1/2	21
3 5-8	27.00	3 1/2	21
3 3-4	29.50	3	21
3 7-8	31.00	3	21
4	33.50	3	21

The Gardner
Die Stock is
Adjustable.

Taper Taps, always sent unless otherwise specified.

We keep in stock the above threads in **V** and United States Standard Shapes.

Unless advised to the contrary, we fill orders with **V** form and in threads as indicated in heavy type. Whitworth thread made to order.

We also keep in stock, 1-64 and 1-32 oversize, up to 1-2 inch, and 1-32 oversize above 1-2 inch, in **V** shaped thread. In ordering, always state exact diameter and thread wanted. When exact duplicates are wanted, special orders should always be accompanied by a stub, with a nut fitting same.

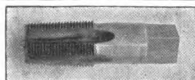


D 196. BRAZED BRASS TUBING TAPS, RIGHT OR LEFT HAND.

Sizes, Inch.	Price.	Threads.	Sizes, Inch.	Price.	Threads.
1-4	\$0.45	27	5-8	\$0.90	27
5-16	.50	27	3-4	1.20	27
3-8	.55	27	7-8	1.60	27
7-16	.60	27	1	2.00	27
1-2	.70	27			

These Taps cut a straight thread.

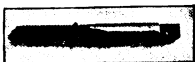
Right-hand sent unless otherwise ordered. We make dies to correspond.



D 197. PLUMBER'S DRAWN BRASS PIPE TAPS—RIGHT OR LEFT.

Sizes, Inch.	Price.	Threads.	Sizes, Inch.	Price.	Threads.
5-8	\$0.90	20	1	\$2.00	18
3-4	1.20	20	1 1-4	2.60	18
7-8	1.60	18	.....	....	..

These Taps are slightly tapered for steam and watertight fits. Right-hand threads will be sent unless otherwise ordered. We make dies to correspond.



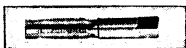
D 202.

PATCH BOLT TAPS.

FOR BOILER MAKERS.

Sizes.	Price Each.	No. Threads.	Sizes.	Price Each.	No. Threads.
1-2	\$0.70	12	13-16	\$1.40	12
9-16	.80	12	7-8	1.60	12
5-8	.90	12	15-16	1.80	12
11-16	1.05	12	1	2.00	12
3-4	1.20	12			

These Taps are slightly tapered to make a steam-tight fit.



D 203.

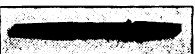
STRAIGHT BOILER TAPS.

SIZES AND PRICES.

12 sharp V threads to the inch.

Diam.	Price.	Diam.	Price.	Diam.	Price.
1-2	\$1.00	25-32	\$1.60	1 1-16	\$3.00
17-32	1.00	13-16	1.80	1 3-32	3.00
9-16	1.15	27-32	1.80	1 1-8	3.20
19-32	1.15	7-8	2.10	1 5-32	3.20
5-8	1.30	29-32	2.10	1 3-16	3.40
21-32	1.30	15-16	2.40	1 7-32	3.40
11-16	1.45	31-32	2.40	1 1-4	3.70
23-32	1.45	1	2.80		
3-4	1.60	1 1-32	2.80		

The tap has a reamer point to size the hole and to serve as a gauge in selecting a drill to precede the tap. It has been adopted by many parties who formerly used the taper tap.

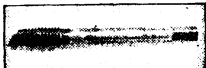


D 204.

BIT BRACE TAPS.

Sizes.	Price Each.	No. Threads.	Sizes.	Price Each.	No. Threads.
3-16	\$0.50	24	3-8	\$0.60	14 16
1-4	.50	16 18 20	7-16	.70	12 14
5-16	.55	16 18	1-2	.80	12 13

Bit Brace Taps will be sent 1-32 oversize, V form unless otherwise ordered.



D 205.

PULLEY TAPS.

Gardner
Die Head
Cuts Accura.
Threads.

Diameter.	No. of Threads to Inch.	PRICE EACH.						
		6 Inch.	8 Inch.	10 Inch.	12 Inch.	14 Inch.	16 Inch.	18 Inch.
3-8	14 16	\$0.80	\$0.90	\$1.10	\$1.30	\$1.40	\$1.60	\$1.80
7-16	14 16	.90	1.00	1.20	1.40	1.60	1.70	1.90
1-2	12 13	1.00	1.30	1.40	1.50	1.60	1.80	2.00
9-16	12 13	1.15	1.35	1.45	1.55	1.70	1.85	2.10
5-8	10 11	1.20	1.40	1.50	1.60	1.75	1.90	2.20
11-16	10 11	1.30	1.50	1.55	1.70	2.00	2.10	2.30
3-4	10	1.40	1.50	1.60	1.80	2.10	2.30	2.50



D 206.

TAP SETS WITH HOLDER FOR USE IN GARDNER DIE STOCK.

No. O....	20	18	16	14	12	11	10
Size.....	1/4	5-16	3/8	7-16	1/2	5/8	3/4
Complete with Holder.....per set, \$ 7.00							

REGULAR TAP SETS.

No. 1.	Tap Wrench, with 10 Machine Screw Taps, Nos. 2 to 14, in case, as shown....	4.00
No. 2.	Tap Wrench, with 18 Machinist's Hand Taps, 3-16 to 1-2 inch, in case, as shown	8.85
No. 3.	Tap Wrench, with 21 Machinist's Hand Taps, 1-4 to 3-4 inch, in case, as shown	12.25
No. 4.	Tap Wrench, with 21 Machinist's Hand Taps, 3-8 to 1 inch, in case, as shown	16.60

D 207.

SELLER'S HOB TAPS.

Diam. Inches.	U. S. Standard No. Threads to Inch.	Length over All.	Price Each.	Diam. Inches.	U. S. Standard No. Threads to Inch.	Length over All.	Price Each.
1-4	20	4 1-4	\$0.90	15-16	9	9	\$3.60
5-16	18	4 1-2	1.05	1	8	9 1-2	4.20
3-8	16	5	1.20	1 1-8	7	9 3-4	4.80
7-16	14	5 1-4	1.35	1 1-4	7	10	5.55
1-2	13	5 3-4	1.50	1 3-8	6	10 1-2	6.30
9-16	12	6	1.75	1 1-2	6	11	7.05
5-8	11	6 1-2	1.95	1 5-8	5 1-2	11 1-2	7.95
11-16	11	7	2.20	1 3-4	5	12	9.00
3-4	10	7 1-2	2.40	1 7-8	5	12 1-2	10.20
13-16	10	8	2.70	2	4 1-2	13	11.55
7-8	9	8 1-2	3.15				

Unless otherwise advised, we fill orders for Seller's Hob Taps with Taps having "United States Standard Threads."

D 208.

LONG TAPER HOB, OR MASTER TAPS.

Sizes.	Price Each.	No. of Threads.	Sizes.	Price Each.	No. of Threads.	Sizes.	Price Each.	No. of Threads.
3-16	\$0.75	24	11-16	\$1.80	11, 12	1 1-4	\$4.60	7
1-4	.75	18, 20	3-4	2.00	10	1 3-8	5.25	6
5-16	.85	16, 18	13-16	2.25	10	1 1-2	5.90	6
3-8	1.00	14, 16	7-8	2.60	9, 10	1 5-8	6.60	5, 5½
7-16	1.15	12, 14, 16	15-16	3.00	9	1 3-4	7.50	5
1-2	1.25	12, 13, 14	1	3.50	8	1 7-8	8.50	4½, 5
9-16	1.45	12, 14	1 1-8	4.00	7, 8	2	9.60	4½, 5
5-8	1.60	10, 11, 12						



D 209.

PIPE HOB TAPS.

Parallel
Clamps
Hold Work
True.

Sizes.....	⅛ in.	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.
Prices.....	\$1.12	1.25	1.50	1.87	2.50	3.12	3.75
Sizes.....	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	
Prices.....	\$4.62	6.25	10.50	15.00	22.00	33.00	

These will be sent right-hand unless otherwise ordered.



D 210.

COMBINED PIPE TAP AND DRILL.

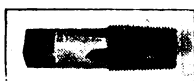
FOR TAPPING GAS AND WATER PIPES.

Size, Inch.	Length, Inches.	Price Each.	Size, Inch.	Length, Inches.	Price Each.	Size, Inch.	Length, Inches.	Price Each.
1-4	3 3-4	\$1.50	3-4	4 1-2	\$3.00	1 1-2	5 1-2	\$5.80
3-8	4	1.75	1	4 3-4	3.80	2	5 3-4	7.60
1-2	4 1-4	2.20	1 1-4	5	4.80	2 1-2	6 1-2	10.00

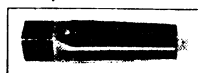
Shanks for sizes 1-4 to 1 1-2 in. are 11-16 in. by 1-2 in. and 1 3-4 inches long.
Shanks for sizes 2 to 2 1-2 in. are 1 in. by 3-4 in. and 2 inches long.

D 211, 212.

PIPE TAPS AND REAMERS.



D 211.



D 212.

Diameter.	Price.	Diameter.	Price.	Diameter.	Price.	Diameter.	Price.
1-8 inch.	\$1.12	3-4 in.	\$2.50	1 1-2 in.	\$4.62	3 in.	\$15.00
1-4 "	1.25	1 "	3.12	2 "	6.25	3 1-2 "	22.00
3-8 "	1.50	1 1-4 "	3.75	2 1-2 "	10.50	4 "	33.00
1-2 "	1.87						

Plug Pipe Taps carried in stock, same list.

SHOWING SHAPES OF THREADS FOR TAPS.

D 213.
V Thread.D 214.
U. S. or Franklin Institute.D 215.
Whitworth. Garden
Grinder
for Fl.
Grindi

D 213. V THREAD OR STANDARD.

Diameter of Tap.	$\frac{1}{4}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2
No. Threads to inch.	20	18	16	14	12	11	10	9	8	7	7	6	6	5	4

With this style of thread the above table, by common consent, has become the Standard.

These Taps we make any fraction of an inch over or under size, to suit customers. All sizes and number of threads to the inch not on lists, also Left Hand, are considered special, and will be charged for accordingly.

When exact duplicates are wanted of special work, orders should be accompanied by a stub, with nut fitting same.

D 214. U. S. OR FRANKLIN INSTITUTE STANDARD.

Diameter of Tap.	$\frac{1}{4}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2
No. Threads to inch.	20	18	16	14	12	11	10	9	8	7	7	6	6	5	4

This style of thread has been adopted by the United States Government, the Master Mechanics' and Master Car Builders' Association, Locomotive Works, Machine Bolt Makers, Saddlery Hardware Makers, and by many manufacturing establishments throughout the country.

The thread has flat sides, at an angle of 60 degrees to each other, with flat top and bottom, equal to one-eighth of the pitch. The advantages of this form of thread, over the sharp V, are, that in the tap, the edges of the thread are less liable to accidental injury, and will wear and retain their size and form longer, and in the bolt, the flat top and bottom give increased strength and an improved appearance.

D 215. WHITWORTH STANDARD.

Diameter of Tap.	$\frac{1}{4}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2
No. Threads to inch.	20	18	16	14	12	11	10	9	8	7	7	6	6	5	4

These Taps are made to order, at the same price of V and U. S. Standard shapes.



D 216.

TAP WRENCHES.

			Each.
No. 0.	5 inches long; fitting Taps 1-16 to	3-16	\$1.00
No. 1.	7 $\frac{1}{2}$ inches long; fitting Taps 1-8 to	3-8	1.50
No. 1 $\frac{1}{2}$.	10 inches long; fitting Taps 3-16 to	1-2	2.00
No. 2.	12 inches long; fitting Taps 1-4 to	5-8	2.00
No. 3.	14 inches long; fitting Taps 1-2 to	3-4	3.00
No. 4.	19 inches long; fitting Taps 3-4 to	1 1-8	4.00
No. 5.	24 inches long; fitting Taps 7-8 to	1 1-2	5.25



D 217. LIGHTNING ADJUSTABLE TAP

AND REAMER WRENCH. Each.

Size A.	10 $\frac{1}{4}$ inches long; fitting Taps 3-16 to	1-2	\$3.00
Size B.	15 inches long; fitting Taps 1-4 to	3-4	3.50
Size C.	20 inches long; fitting Taps 3-8 to	1	5.00



D 218. GREEN RIVER ADJUSTABLE TAP WRENCHES. Each.

No. 1.	7 inches long; fitting Taps 1-4 inch and smaller	\$1.75
No. 2.	11 inches long; fitting Taps 3-16 to	1-2 inclusive 2.35
No. 3.	16 inches long; fitting Taps 1-4 to	3-4 inclusive 3.00
No. 4.	19 inches long; fitting Taps 3-8 to	1 inclusive 4.00
No. 5.	30 inches long; fitting Taps 7-8 to	1 1-2 inclusive 8.00



D 219. ELTERICH'S TAP WRENCHES.

HOLDING 1-4 INCH TAPS AND SMALLER.

Price each.....\$1.50

**D 220. ROUND ADJUSTABLE DIES.**

All orders for Round Adjustable Dies one inch in diameter will be filled with this style of Die, unless something different is specified.

These Dies are made with standard number of threads to the inch, unless otherwise specified on the order.

Special sizes and threads furnished at 50 per cent. advance on list. Sizes and threads not given in this list will be considered special.

Size of Die.		Size of Screw Gauge.	Standard No. Threads to Inch.	Threads also Furnished.	Price Each.
Diameter, Inches.	Thickness, Inches.				
1	3-8	No. 4	36	32 and 40	\$0.75
1	3-8	" 5	36	30, 32 and 40	.75
1	3-8	" 6	32	30, 36 and 40	.75
1	3-8	" 7	32	28 and 30	.75
1	3-8	" 8	32	24 and 30	.75
1	3-8	" 9	30	24, 28 and 32	.75
1	3-8	" 10	24	28, 30 and 32	.75
1	3-8	" 11	24	28 and 30	.75
1	3-8	" 12	24	20, 22 and 28	.75
1	3-8	" 13	22	20 and 24	.75
1	3-8	" 14	20	22 and 24	.75
1	3-8	" 15	20	18, 22 and 24	.75
1	3-8	" 16	18	16, 20 and 24	.75
1	3-8	" 17	18	16 and 20	.75
1	3-8	" 18	18	16 and 20	.75
1	3-8	" 19	18	16 and 20	.75
1	3-8	" 20	16	18 and 20	.75
1	3-8	" 22	16	18	.75
1	3-8	" 24	16	14 and 18	.75
1	3-8	1-8	40	32 and 36	.75
1	3-8	9-64	40	32 and 36	.75
1	3-8	5-32	32	36 and 40	.75
1	3-8	11-64	32	36 and 40	.75
1	3-8	3-16	24	22, 32 and 36	.75
1	3-8	13-64	24	22, 32 and 36	.75
1	3-8	7-32	24	28, 32 and 36	.75
1	3-8	15-64	24	28, 32 and 36	.75
1	3-8	1-4	20	16 and 18	.75
1	3-8	5-16	18	16 and 20	.75
1	3-8	3-8	16	14 and 18	.75
1	3-8	7-16	14	16	.75

D 221.

Stocks for holding 1 in. Round Dieseach, \$1.50
Stocks for holding 1 5-16 in. Round Dies, each, 2.00

**D 222. DIE HOLDERS.**

FOR USE IN LATHE OR TURRET OF SCREW MACHINE.

Bonanza Oil Cups are Good.

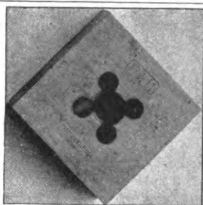
	Each.
No. 1. Holding Round Adjustable Dies, 5-8 inch in diameter.....	\$0.50
The shanks of the No. 1 Holders are 1-2 inch in diameter.	
No. 1½. Holding "Smith" Patent Adjustable Dies, 13-16 inch in diameter,	.50
The shanks of the No. 1½ Holders are 1-2, 9-16, and 11-16 in. in diameter.	
No. 2. Holding "Smith" Patent Adjustable Dies, 1 inch in diameter....	.75
The shanks of the No. 2 Holders are 1-2, 9-16, and 11-16 in. in diameter.	
No. 3. Holding "Smith" Patent Adjustable Dies, 1 5-16 inch in diameter,	1.50
The shanks of the No. 3 Holders are 11-16, 3-4, 13-16 in. in diameter.	
No. 4. Holding "Smith" Patent Adjustable Dies, 1 9-16 inch in diameter,	2.75
The shanks of the No. 4 Holders are 3-4, 13-16, and 1 in. in diameter.	
No. 5. Holding "Smith" Patent Adjustable Dies, 2 1-4 inches in diameter,	4.00
The shanks of the No. 5 Holders are 1 1-16, 1 1-8, and 1 1-4 inches in diameter.	

The above prices are for the Holders only. The list prices of Dies fitting these Holders furnished on application.

In ordering these Holders, mention which size shank is desired.

**D 223. BIT-BRACE DIE HOLDERS.**

	Each.
No. 1. Holding Round Adjustable Dies, 5-8 inch in diameter.....	\$0.50



D 224.

Dies, Sp
Shapes:
Threads
to Order

MACHINE OR SOLID BOLT DIES.

All Solid Bolt Dies will be sent even-size, unless over-size is specified on the order.

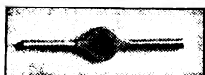
Cutting Size— Inches.	Standard No. Threads to Inch.	Threads also Furnished.	Outside Dimensions.		Price Each.
			Size Square, Inches.	Thickness, Inches.	
1-4	20	18	2 1/2	1/2	\$1.80
5-16	18	16	2 1/2	1/2	1.80
3-8	16	14	2 1/2	1/2	1.80
7-16	14		2 1/2	1/2	1.80
1-2	12	13	2 1/2	1/2	1.80
9-16	12		2 1/2	3/4	1.90
5-8	11	12	2 1/2	3/4	2.00
11-16	11		2 1/2	3/4	2.15
3-4	10	12	2 1/2	3/4	2.25
13-16	10		2 1/2	3/4	2.30
7-8	9	12	2 1/2	3/4	2.40
15-16	9		2 1/2	3/4	2.55
1	8	12	2 1/2	1	2.70
1 1-8	7		2 1/2	1	3.00
1 1-4	7		2 1/2	1	3.30
1 3-8	6		2 1/2	1	3.60
1 1-2	6		3	1	3.90
1 5-8	5		3	1	4.20
1 3-4	5		3	1 1/4	5.40
1 7-8	4 1/2		3 1/2	1 1/2	6.50
2	4 1/2		3 3/4	2	7.50



D 225. ROUND ADJUSTABLE DIES.

All Dies five-eighths of an inch in diameter are made this style. These Dies are made with standard number of threads to the inch, unless a different thread is called for.

Size of Die.		Size of Screw Gauge.	Standard No. Threads to inch.	Threads also Furnished.	Price Each.
Diameter, Inches.	Thickness, Inches.				
5-8	1-4	No. 2	56	48 and 64	\$0.40
5-8	1-4	" 3	48	40 and 56	.40
5-8	1-4	" 4	36	32 and 40	.40
5-8	1-4	" 5	36	30, 32 and 40	.40
5-8	1-4	" 6	32	30, 36 and 40	.40
5-8	1-4	" 7	32	28 and 30	.40
5-8	1-4	" 8	32	24 and 30	.40
5-8	1-4	" 9	30	24, 28 and 32	.40
5-8	1-4	" 10	24	28, 30 and 32	.40
5-8	1-4	" 11	24	28 and 30	.40
5-8	1-4	" 12	24	20, 22 and 28	.40
5-8	1-4	" 13	22	20 and 24	.40
5-8	1-4	" 14	20	22 and 24	.40
5-8	1-4	1-16	72	60 and 64	.40
5-8	1-4	5-64	72	56, 60 and 64	.40
5-8	1-4	3-32	56	48, 50 and 60	.40
5-8	1-4	7-64	56	48, 50 and 60	.40
5-8	1-4	1-8	40	32 and 36	.40
5-8	1-4	9-64	40	32 and 36	.40
5-8	1-4	5-32	32	36 and 40	.40
5-8	1-4	11-64	32	36 and 40	.40
5-8	1-4	3-16	24	22, 32 and 36	.40
5-8	1-4	13-64	24	22, 28, 32 and 36	.40
5-8	1-4	7-32	24	28, 32 and 36	.40
5-8	1-4	15-64	24	28, 32 and 36	.40
5-8	1-4	1-4	20	18, 22, 24, 26 and 32	.40
5-8	1-4	17-64	20	18, 22, 24, 26 and 32	.40



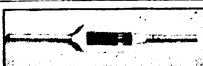
D 226.

Stocks for holding 5-8 in. Round Dies, each, \$0.40
Stocks for holding 13-16 in. Round Dies, each, .50



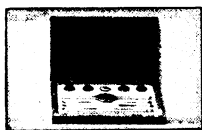
D 227. GUNSMITHS' AND AMATEURS' SCREW PLATES. Each.

No. 00 B.	6 inches long, 4 pair Dies and 4 Taps; cutting 4, 48; 6, 40; 8, 36; 10, 32.....	\$2.50
No. 00 C.	6 inches long, 4 pair Dies and 4 Taps; cutting 4, 40; 6, 36; 8, 34; 10, 30.....	2.50
No. 0 B.	7½ inches long, 4 pair Dies and 4 Taps; cutting 8, 36; 10, 34; 12, 30; 14, 28.....	3.25
No. 0 C.	7½ inches long, 4 pair Dies and 4 Taps; cutting 8, 32; 10, 30; 12, 28; 14, 26.....	3.25



D 228. PUMP PLATES. Each.

No. 12.	12 3-4 inches long, 2 pair Dies; cutting 3-8, 14; 7-16, 12.....	\$3.00
No. 13.	15 1-2 inches long, 3 pair Dies; cutting 3-8, 14; 7-16, 12; 1-2, 12.	3.50



D 229. CARD'S BICYCLE SCREW PLATE. Each.
 Helmet Bronze makes Stiff Springs.

SET No. 1.	Stock 5 inches long; Dies 5-8 inch in diameter; 6 Dies and 6 Taps; cutting 3-32, 54; 1-8, 40; 1-8, 42; 3, 48; 3, 56; 6, 38, or an equal number of regular sizes from table on page 44. Price, complete, in hardwood case.....	\$4.40
SET No. 2.	Stock 5 inches long; Dies 5-8 inch in diameter; 6 Dies and 6 Taps; cutting 3-32, 56; 7-64, 56; 9-64, 40; 1, 64; 1 1-2, 56; 2, 48, or an equal number of regular sizes from table on page 44. Price, complete, in hardwood case.....	4.40
SET No. 3.	Stock 5 inches long; Dies 5-8 inch in diameter; 14 Dies and 14 Taps; cutting 3-32, 52; 3-32, 54; 3-32, 56; 7-64, 56; 1-8, 40; 1-8, 42; 9-64, 40; 1, 64; 1 1-2, 56; 2, 48; 3, 48; 3, 56; 4, 42; 6, 38, or an equal number of regular sizes from table on page 44. Price, complete, in hardwood case.....	8.90
SET No. 4.	Stock 5 inches long; Dies 5-8 inch in diameter; 6 Dies and 6 Taps; cutting 1, 72; 1, 64; 1-16, 72; 2, 56; 3, 56; .105", 40.....	4.40

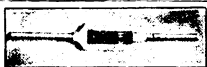
These Plates are convenient, as they are especially adapted to Bicycle work. The Dies are adjustable for making tight or loose fits. Plug Taps are furnished with these Plates.



D 230. MACHINISTS' SCREW PLATES. Each.

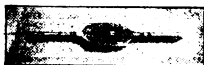
No. 00.	6 inches long, 4 pair Dies and 4 Taps; cutting 2, 64; 3, 56; 4, 48; 6, 40.....	\$2.50
No. 00 A.	6 inches long, 3 pair Dies and 4 Taps; cutting 4, 36; 6, 32; 8, 32; 10, 24.....	2.50
No. 00 M.	6 inches long, 4 pair Dies and 4 Taps; cutting 1-16, 64; 3-32, 56; 7-64, 48; 1-8, 40.....	2.50
No. 00 N.	6 inches long, 3 pair Dies and 4 Taps; cutting 1-8, 36; 9-64, 32; 5-32, 32; 3-16, 24.....	2.50
No. 0.	7 1-2 inches long, 4 pair Dies and 4 Taps; cutting 4, 48; 6, 40; 10, 32; 14, 24.....	3.00
No. 0 A.	7 1-2 inches long, 3 pair Dies and 4 Taps; cutting 10, 24; 12, 24; 14, 20; 16, 18.....	3.25
No. 0 M.	7 1-2 inches long, 4 pair Dies and 4 Taps; cutting 7-64, 48; 1-8, 40; 3-16, 32; 1-4, 24.....	3.00
No. 0 N.	7 1-2 inches long, 4 pair Dies and 4 Taps; cutting 3-16, 24; 7-32, 24; 1-4, 20; 9-32, 18.....	3.25

These Plates are furnished with Plug Machine Screw Taps.



D 231. MACHINISTS' SCREW PLATES. Each.

No. 1½.	9 inches long, 4 pair Dies and 4 Taps; cutting 6, 32; 8, 30; 10, 24; 14, 20.....	\$3.25
No. 1½ A.	9 inches long, 3 pair Dies and 4 Taps; cutting 14, 20; 16, 18; 18, 18; 20, 16.....	3.40
No. 1½ M.	9 inches long, 4 pair Dies and 4 Taps; cutting 9-64, 32; 5-32, 30; 3-16, 24; 1-4, 20.....	3.25
No. 1½ N.	9 inches long, 3 pair Dies and 4 Taps; cutting 1-4, 20; 17-64, 18; 9-32, 18; 5-16, 16.....	3.40



D 232.

MACHINISTS' SCREW PLATES.

Each.

- No. 1. 7 1-2 inches long, 3 pair Dies and 6 Taps; cutting 4, 40; 6, 40; 4, 36; 6, 36; 8, 32; 10, 32..... \$4.50
- No. 2. 8 1-2 inches long, 3 pair Dies and 6 Taps; cutting 6, 32; 8, 32; 10, 24; 12, 24; 14, 20; 16, 20..... 4.50

These Plates are furnished with Plug Machine Screw Taps.



D 233.

MACHINISTS' SCREW PLATES.

Each.

- No. 2 1/2. 11 1-2 inches long, 3 pair Dies and 3 Taps; cutting 1-4, 20; 3-8, 16; 1-2, 12..... \$5.00
- No. 2 1/2 A. 11 1-2 inches long, 3 pair Dies and 3 Taps; cutting 1-4, 20; 5-16, 18; 3-8, 16..... 4.80
- No. 2 1/2 B. 11 1-2 inches long, 3 pair Dies and 3 Taps; cutting 5-16, 18; 3-8, 16; 7-16, 14..... 5.00
- No. 2 1/2 C. 11 1-2 inches long, 5 pair Dies and 5 Taps; cutting 1-4, 20; 5-16, 18; 3-8, 16; 7-16, 14; 1-2, 12..... 7.50
- No. 3. 14 inches long, 3 pair Dies and 3 Taps; cutting 3-8, 16; 7-16, 14; 1-2, 12..... 5.50
- No. 3 A. 14 inches long, 3 pair Dies and 3 Taps; cutting 3-8, 16; 1-2, 12; 5-8, 11..... 5.80
- No. 3 B. 14 inches long, 3 pair Dies and 3 Taps; cutting 7-16, 14; 1-2, 12; 5-8, 11..... 5.90
- No. 3 C. 14 inches long, 4 pair Dies and 4 Taps; cutting 3-8, 16; 7-16, 14; 1-2, 12; 5-8, 11..... 7.15
- No. 3 D. 14 inches long, 6 pair Dies and 6 Taps; cutting 1-4, 20; 5-16, 18; 3-8, 16; 7-16, 14; 1-2, 12; 5-8, 11..... 9.60
- No. 4 A. 19 inches long, 3 pair Dies and 3 Taps; cutting 1-2, 12; 5-8, 11; 3-4, 10..... 6.90
- No. 4 B. 19 inches long, 7 pair Dies and 7 Taps; cutting 1-4, 20; 5-16, 18; 3-8, 16; 7-16, 14; 1-2, 12; 5-8, 11; 3-4, 10..... 13.50

Machinists' Taper Hand Taps are sent with the above Plates.

**D 234. "DIAMOND" SCREW PLATES.**

Each.

- "DIAMOND" A. "Diamond" Plate with Tap Wrench; Plate, 5 inches long; Tap Wrench, 5 inches long; 6 Dies, 5-8 of an inch in diameter, and 6 Taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24; 14, 20..... \$4.90
- "DIAMOND" B. "Diamond" Plate with Tap Wrench; Plate, 5 inches long; Tap Wrench, 5 inches long; 5 Dies, 5-8 of an inch in diameter, and 5 Taps; cutting 4, 36; 6, 32; 8, 32; 10, 24; 12, 24..... 4.45
- "DIAMOND" C. "Diamond" Plate with Tap Wrench; Plate, 5 inches long; Tap Wrench, 5 inches long; 4 Dies, 5-8 of an inch in diameter, and 4 Taps; cutting 6, 32; 8, 32; 10, 24; 12, 24..... 3.90
- "DIAMOND" D. "Diamond" Plate with Tap Wrench; Plate, 5 inches long; Tap Wrench, 5 inches long; 8 Dies, 5-8 of an inch in diameter, and 8 Taps, cutting 2, 56; 3, 48; 4, 36; 5, 32; 6, 32; 10, 24; 12, 24; 14, 20..... 6.20
- "DIAMOND" E. "Diamond" Plate with Tap Wrench; Plate, 5 inches long; Tap Wrench, 5 inches long; 10 Dies, 5-8 of an inch in diameter, and 10 Taps; cutting 2, 56; 3, 48; 4, 36; 5, 32; 6, 32; 8, 32; 10, 32; 10, 24; 12, 24; 14, 20..... 7.25

Plug Machine Screw Taps are sent with these Plates.

Each complete Plate as catalogued, sent in hardwood case.

Taps and Dies for special work requiring great accuracy, made to order and to any degree of accuracy.

D 236. DUPLEX DIE STOCKS FOR THREADING PIPE.



No.	Pipe.	Without Cut-off.	With Cut-off.
1	Threading $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, ...	\$13.00	\$16.00
2	" $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$	17.00	20.00
3	" 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2, ...	22.00	25.00
3 $\frac{1}{2}$	" $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2, ...	25.00	28.00
4	" $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, ...	40.00	45.00
5	" $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, ...	55.00	60.00



DUPLEX DIE STOCKS FOR THREADING BOLTS.

D 237. FOR MACHINISTS AND MODEL MAKERS.

Size A A Cuts, {	Diameter, 1-8	3-16	1-4	5-16	3-8	7-16	1-2
	Threads, 32	24	20	18	16	14	12
Put up in case with 7 Taps and 7 Sets of Dies, \$15.00.							
Size A Cuts, {	Diameter, 1-4	5-16	3-8	7-16	1-2 & 9-16	5-8	3-4
	Threads, 20	18	16	14	12	11	10
Put up in case with 8 Taps and 7 Sets of Dies, \$20.00.							
Size B Cuts, {	Diameter, 1-4	5-16	3-8	7-16	1-2 & 9-16	5-8	3-4
	Threads, 20	18	16	14	12	11	10
Put up in case with 10 Taps and 9 Sets of Dies, \$30.00.							



D 238.

STOCKS AND DIES FOR PIPE.

Gardner
Opening
Die Head
Cuts Exact
Threads.

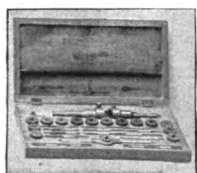
No.	Threads.	Dimensions of Dies.	Die Plates Complete.	Without Dies.	Extra Dies.	Extra Bushings.	Extra Die Frames.
0	$\frac{1}{8}$ to $\frac{1}{2}$	2 x2 x $\frac{1}{2}$	\$ 9.50	\$ 3.50	\$1.50	\$0.25	....
1	$\frac{1}{4}$ to 1	2 $\frac{1}{2}$ x2 $\frac{1}{2}$ x $\frac{3}{4}$	15.00	5.00	2.00	.35	\$0.30
1 $\frac{1}{2}$	$\frac{3}{8}$ to $1\frac{1}{4}$	3 x3 x $\frac{3}{4}$	13.50	6.00	2.50	.45	.40
1 $\frac{3}{4}$	1 to $1\frac{1}{2}$	3 x3 x $\frac{3}{4}$	13.50	6.00	2.50	.45	.40
2	1 $\frac{1}{4}$, $1\frac{1}{2}$ & 2	4 x4 x $\frac{3}{4}$	20.00	9.50	3.50	.60	.50
3	2 $\frac{1}{4}$ & 3	5 x5 x1 $\frac{1}{4}$	43.00	25.00	9.00	1.00	.60
4	2 $\frac{1}{2}$ & 3	5 x5 x1 $\frac{1}{4}$	51.00	33.00	9.00	1.00	.60



LIGHTNING SCREW PLATES.

D 239. No. 0, set with 5 sizes 1-8 to 1-4 inch, or with 5 sizes to corresponding wire gauge numbers. Price in case.....\$ 5.50

D 239. No. 0, set with 7 sizes, 7-64 to 1-4 inch, or with 7 sizes to corresponding wire gauge numbers. Price in case..... 7.00



THE LIGHTNING SCREW PLATE.

ASSORTMENT No. 0, STOCK 6 IN. LONG.

D 240. Full set of No. 0, with 14 sizes taps and dies, 5-64 to 9-32, tap wrench, bit brace holder, and holder for lathe use, price\$15.00

D 241. TAPS AND DIES FURNISHED WITH NO. 0 LIGHTNING SCREW PLATE.

Diameter, Inch.	No. Threads to Inch.	Screw Gauge No. about.	Diameter, Inch.	No. Threads to Inch.	Screw Gauge No. about.
5-64	60	2	3-16	24	10
3-32	48	3	13-64	24	11
7-64	40	4	7-32	24	12
1-8	36	5	15-64	24	13
9-64	32	6	1-4	20	14
5-32	32	8	17-64	18	16
11-64	32	9	9-32	18	18

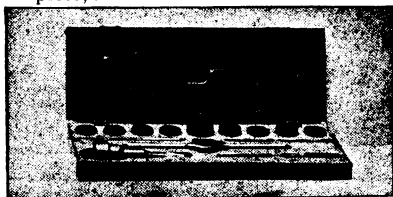
PRICES OF SINGLE PARTS OF NO. 0 SETS.

Die, Guide and Tap (reg'l'r sizes).....\$1.00	Tap Wrench (fitting in stock)....\$0.50
Dies, regular sizes......60	Stock......75
Guides......15	Holders, round shanks, or for brace .75
Taps, regular sizes......40	Stock, with one handle......75



THE LIGHTNING SCREW PLATE.

- D 242.** SET A. 3-16 to 7-16 inch Stock, 10 inches long, and 5 sizes Taps, Dies and Guides, 3-16, 1-4, 5-16, 3-8, 7-16 inch. Price, complete, in case.....\$ 8.00
- D 243.** SET A. Stock 10 inches long and Screw Gauge, sizes of Taps, Dies and Guides Nos. 14, 16, 18, 20, 24. Price, complete in case.... 8.00
- D 244.** SET A. With 7 sizes, Nos. 10 to 24, Stock 10 inches long; and Screw Gauge sizes Nos. 10, 12, 14, 16, 18, 20 and 24. Price, complete, in case..... 10.00



- D 245.** SET A 1. 3-16 to 7-16 inch, Stock 10 inches long, Bit Brace Holder and Nut Wrenches, 5 sizes Taps, Dies, Guides and Nut Wrenches, 3-16, 1-4, 5-16, 3-8, 7-16 inches. Price, in case..... 10.00

Use Bona
Cups for
Helmet C

Diameter of Dies in above sets 1 5-16 inch. Will send (except Screw Gauge sizes) 1-32 oversize V thread, unless otherwise ordered.



THE LIGHTNING SCREW PLATES.

- D 246.** SET AA. 3-16 to 1-2 inch, Stock 18 inches long, 6 sizes 3-16, 1-4, 5-16, 3-8, 7-16, 1-2 inch Taps, Dies and Collets. Price, complete.....\$13.50
No. 2 Adjustable Tap Wrench for above 2.35
- Diameter of Collets in this set 2 3-16 inches.
- D 247.** SET B. 1-4 to 3-4 inch, Stock 23 inches long, 7 sizes 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch Taps, Dies and Collets. Price, complete.... 16.00
Diameter of Collets in this set 2 3-4 inches.
- D 248.** SET C. 3-8 to 1 inch, Stock 29 inches long, 7 sizes 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch Taps, Dies and Collets. Price, complete..... 22.00
Diameter of Collets in this set 2 3-4 inches.
- D 249.** SET C. 1-4 to 1 inch, Stock 29 inches long, 9 sizes 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8 1 inch Taps, Dies and Collets. Price, complete 25.50
Diameter of Collets in this set 2 3-4 inches.
- D 250.** SET D. 7-8 to 1 1-2 inch, Stock 53 inches long, 6 sizes 7-8, 1, 1 1-8, 1 1-4, 1 3-8, 1 1-2 inch Taps, Dies and Collets. Price, complete..... 45.00
Will send above sets 1-32 oversize. V thread unless otherwise ordered. Left hand extra price.



D 251.

LIGHTNING DIE.

USED IN SETS.

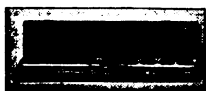
In adjusting the Die, the binding screws A A, are first slackened, and the size required fixed by moving the taper-headed screws B B, in or out; after which the binding screws A A, are set very tight the last thing.

Sizes.	Taps, Dies and Collets.	Dies.	Taps.	Collets.	No. of Threads.	
For No. D and 7-8 to For No. AA, B, C, E, L and sizes 1-4 to 1-2 sizes in D & E, 3-4 of No. D and B plate.	3-16	\$1.77	\$1.00	\$0.45	\$0.50	24
	1-4	1.77	1.00	.45	.50	16, 18, 20
	5-16	1.80	1.00	.50	.50	16, 18
	3-8	1.98	1.15	.55	.50	14, 16, 18
	7-16	2.16	1.30	.60	.50	12, 14, 16
	1-2	2.42	1.50	.70	.50	12, 13, 14
	9-16	2.73	1.75	.80	.50	12, 14
	5-8	2.94	1.90	.90	.50	10, 11, 12
	11-16	3.23	2.10	1.05	.50	11, 12
	3-4	3.57	2.35	1.20	.50	10, 12
	13-16	3.94	2.60	1.40	.50	10
	7-8	4.46	3.00	1.60	.50	9, 10
	15-16	4.98	3.40	1.80	.50	9
	1	5.45	3.75	2.00	.50	8
	7-8	4.96	3.00	1.60	1.00	9, 10
	15-16	5.48	3.40	1.80	1.00	9
	1	5.95	3.75	2.00	1.00	8
	1 1-8	6.75	4.40	2.25	1.00	7, 8
	1 1-4	7.56	5.00	2.60	1.00	7
	1 3-8	8.55	5.75	3.00	1.00	6
	1 1-2	10.10	7.00	3.50	1.00	6

LIGHTNING SCREW PLATES FOR PIPE.

- D 252.** SET C. Consisting of Stock, 35 inches long, and 5 sizes of Dies, (right or left) and Guides 1-4, 3-8, 1-2, 3-4, and 1 inch. Complete as above in substantial case.....\$12.00
 1-8 inch supplied with this set extra..... 1.75
 Supplied with English (Birmingham) Standard Threads if so ordered. Parts separately; Stock 35 inches long, \$3.50; Dies, \$1.50; Guides, \$0.25 each.
- D 253.** SET D. Consisting of Stock 53 inches long, with a Leader Screw and 3 sizes of Dies (right or left), and Guides 1 1-4, 1 1-2, and 2 inches. Complete as above, in substantial case..... 20.00
 Size 1 inch, if ordered with this set (including bushing and Guide) extra..... 3.00
 Supplied with English (Birmingham) Standard Threads if so ordered. Parts separately; Stock, 53 inches long, \$7.00; Dies, \$4.00; Guides, \$0.50 each. **Helmet Oil Lubricates Anything.**
- D 254.** SET C AND D COMBINED. Consisting of two Stocks and 8 sizes of Dies (right or left) and Guides. (Large Stock with Leader Screw) 1-4, 3-8, 1-2, 3-4, 1, 1 1-4, 1 1-2, and 2 inches. Complete, in substantial case..... 32.00

THE GREEN RIVER SCREW PLATES.



- D 255.** SET No. 1. 3-16 to 7-16, Stock 10 inches long, with both Stock and Brace Holder for Dies, 5 sizes, 3-16, 1-4, 5-16, 3-8, 7-16 inch Taps, Dies and Guides. Complete, in case, \$ 8.75
 Brace Holders (or Lathe Holders) to take Dies in this set, each..... 0.75
 Diameter of Dies in this set, 1 5-16 inch.
- D 256.** SET No. 2. 1-4 to 3-4 inch, Stock 23 inches long, 7 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4 inch, Taps, Dies and Guides. Complete, in case..... 15.25
- D 257.** SET No. 2. As above with Adjustable Tap Wrench No. 3..... 18.25
 Diameter of Dies in this set 2 3-4 inch.

THE GREEN RIVER SCREW PLATES.

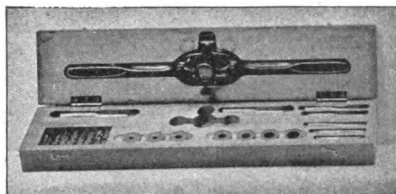


- D 258.** SET No. 3. 1-2 to 1 inch, Stock 29 inches long, 5 sizes, 1-2, 5-8, 3-4, 7-8, 1 inch, Taps, Dies and Guides. Complete, in case.....\$17.00
- D 259.** SET No. 3. As above, with Adjustable Tap Wrench No. 4..... 21.00
 Diameter of Dies in this set, 2 3-4 inches.
- D 260.** SET No. 4. 3-8 to 1 inch, Stock 29 inches long, 7 sizes, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch, Taps, Dies and Guides. Complete, in case. 20.00
- D 261.** SET No. 4. As above, with Adjustable Tap Wrench No. 4..... 24.00
 Diameter of Dies in this set, 2 3-4 inches.
- D 262.** SET No. 5. 1-4 to 1 inch, Stock 29 inches long, 9 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1 inch, Taps, Dies and Guides. Complete, in case..... 23.00
- D 263.** SET No. 5. As above, with Adjustable Tap Wrenches, Nos. 2 and 4..... 29.35
 Diameter of Dies in these sets, 2 3-4 inches.
- D 264.** SET No. 6. 1-2 to 1 1-4 inch, Stock 35 inches long, 7 sizes, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch, Taps, Dies and Guides. Complete, in case..... 26.00
 For prices Adjustable Tap Wrenches, sizes, Nos. 3 and 5, see D 218.
 Diameter of Dies in this set, 2 3-4 inches.
- D 265.** SET No. 7. 3-8 to 1 1-4 inch, Stock 35 inches long, 9 sizes, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch, Taps, Dies and Guides. Complete, in case..... 30.00
 For prices Adjustable Tap Wrenches, sizes Nos. 3 and 5, see D 218.
 Diameter of Dies in this set, 2 3-4 inches.
- D 266.** SET No. 8. 1-4 to 1 1-4 inch, Stock 35 inches long, 11 sizes, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 7-8, 1, 1 1-8, 1 1-4 inch, Taps, Dies and Guides. Complete, in case..... 34.00
 For prices Adjustable Tap Wrenches, sizes Nos. 3 and 5, see D 218.
 Diameter of Dies in this set, 2 3-4 inches.
 Will send all Green River Sets 1-32 oversize V threads, unless otherwise ordered.



GARDNER DIE STOCKS.

OUR OWN MAKE.

Helmet
Bronze for
Springs.

D 267. No. 1, GARDNER DIE STOCK IN CASE, complete, with 7 sizes Taps, Dies, and Hardened Bushings; cutting $\frac{1}{4}$ to $\frac{3}{4}$ inch inc.; Stock 18 $\frac{1}{2}$ inch. long, price\$16.00
Stock Nickel Plated, extra..... 1.00

PRICE FOR EXTRA PARTS.

No. 1 Case.....each, \$0.75	No. 1 Dies.....each, \$1.30
No. 1 Tap Holder....." 1.30	No. 1 Bushings....." .25
No. 1 Stock....." 3.50	

$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ inch Iron Pipe size Dies for No. 1 Stock, each, \$1.30.

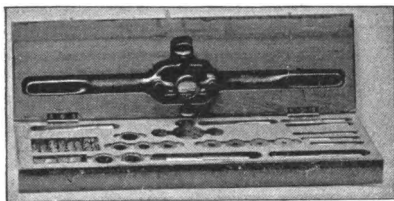


D 268. No. 1 $\frac{1}{2}$, GARDNER DIE STOCK, complete, with 9 sizes Taps, Dies and Hardened Bushings; cutting $\frac{1}{4}$ to 1 inch inclusive; Stock 20 $\frac{1}{2}$ inch. long, price.....\$22.00
Stock Nickel Plated, extra..... 1.00

PRICES FOR EXTRA PARTS.

No. 1 $\frac{1}{2}$ Stock.....each, \$3.50	No. 1 $\frac{1}{2}$ Tap Holder.....each, \$1.30
No. 1 $\frac{1}{2}$ Dies....." 1.30	No. 1 $\frac{1}{2}$ Case....." .75
No. 1 $\frac{1}{2}$ Bushings....." .25	

$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ inch Iron Pipe size Dies for No. 1 $\frac{1}{2}$ Stock, each, \$1.30.

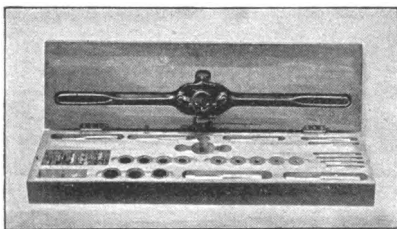


D 269. No. 2, GARDNER DIE STOCK, complete, with 9 sizes Taps, Dies and Hardened Bushings; cutting $\frac{1}{4}$ to 1 inch inclusive; Stock 28 inches long, price.....\$27.00
Nickel Plated, extra.. 2.00

PRICES FOR EXTRA PARTS.

No. 2 Stock.....each, \$5.00	No. 2 Case.....each, \$1.00
No. 2 Dies....." 1.60	No. 2 Tap Holder....." 1.60
No. 2 Bushings....." .40	

$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ inch Iron Pipe size Dies for No. 2 Stock, each, \$1.60.



D 270. No. 2 $\frac{1}{2}$, GARDNER DIE STOCK, complete, with 11 sizes Taps, Dies and Hardened Bushings; cutting $\frac{1}{4}$ to 1 $\frac{1}{4}$ inch inclusive; Stock 28 inches long, price.....\$35.00
Nickel Plated, extra.. 2.00

PRICES FOR EXTRA PARTS.

No. 2 $\frac{1}{2}$ Stock.....each, \$5.00	No. 2 $\frac{1}{2}$ Case.....each, \$1.50
No. 2 $\frac{1}{2}$ Dies....." 1.60	No. 2 $\frac{1}{2}$ Tap Holder....." 1.60
No. 2 $\frac{1}{2}$ Bushings....." .40	

$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 inch Iron Pipe size Dies for No. 2 $\frac{1}{2}$ Stock, each, \$1.60.

GUARANTEE.

If you want a Die Stock order a GARDNER. If after receiving it and trying it you do not like it you may return the Die Stock to us and we will pay the return expressage and refund the money you paid us for the GARDNER Die Stock.

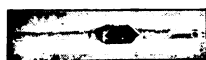
D 271. BADGER NON-ADJUSTABLE DIES AND HOLDERS.

BICYCLE SIZES — FULL MOUNTED.

CUTS THE SAME SIZE EVERY TIME.



Sheet Brass
Cut to Size
from Stock.



Prices include Tap
Wrench as shown
above.

Each Die with handle and guide complete in itself.
Full thread at one cut.
Can furnish in all machine screw sizes.
Just the thing for Bicycle Repair Shops.

THE STOCKS IN THESE BICYCLE SETS ARE REGULAR NO. 0 BADGER DIE STOCKS.

- SET No. 1. Stock 5 inches long, 6 Dies and 6 Taps; cutting 3-32, 54; 1-8, 40; 1-8, 42; 3, 48; 3, 56; 6, 38, or an equal number of regular sizes. Price complete, in case, with Tap Wrench..... \$5.00
- SET No. 2. Stock 5 inches long, 6 Dies and 6 Taps; cutting 3-32, 56; 7-64, 56; 9-64, 40; 1, 64; 1 1-2, 56; 2, 48, or an equal number of regular sizes. Price complete, in case, with Tap Wrench..... 5.00
- SET No. 3. Stock 5 inches long, 14 Dies and 14 Taps; cutting 3-32, 52; 3-32, 54; 3-32, 56; 7-64 56; 1-8, 40; 1-8, 42; 9-64, 40; 1, 64; 1 1-2, 56; 2, 48; 3, 48; 3, 56; 4, 42; 6, 38, or an equal number of regular sizes. Price, complete, in case, with Tap Wrench..... 10.00
- SET No. 4. Stock 5 inches long, 6 Dies and 6 Taps; cutting 1, 72; 1, 64; 1-16, 72; 2, 56; 3, 56; .105, 40. Price, with Tap Wrench..... 5.00
- These Plates are convenient, as they are especially adapted to Bicycle work. Plug Taps are furnished with these Plates.



No. 0.

D 272.

BADGER DIE STOCK, COMPLETE WITH DIE AND GUIDE.

Price includes Stock, Die and Tap.

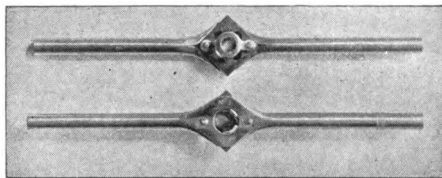
- No. 0. Length 5 inches; all Machine Screw Sizes and Bolt Sizes to 1-4 inclusive. Price, each Screw Plate with Tap \$0.80



D 273. BADGER NON-ADJUSTABLE DIES AND HOLDERS.**BOLT SIZES — FULL MOUNTED.**

THE STOCK, DIE AND GUIDE ARE RIVETED TOGETHER SOLID, MAKING A FULL MOUNTED SCREW PLATE WHICH CANNOT GET OUT OF ORDER.

CUTS THE SAME SIZE EVERY TIME.



Bonanza
Cups for
Helmet Oil

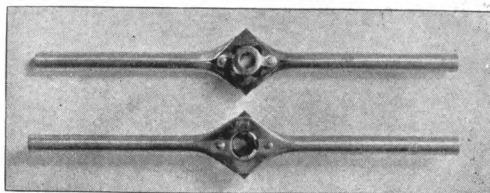
D 274.**No. 1. Length 9 Inches.**

Cuts 1-4 in.; 20 threads. Complete, Stock, Die and Guide, with Tap, \$1.30

" 5-16 " 18 " " " " " " " " 1.30

" 3-8 " 16 " " " " " " " " 1.30

Any other threads furnished. Odd threads extra price.

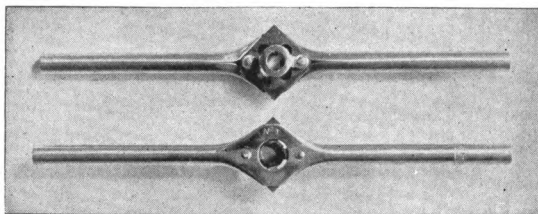
**D 275.****No. 2. Length 14 Inches.**

Cuts 3-8 in.; 16 threads. Complete, Stock, Die and Guide, with Tap, \$1.30

" 7-16 " 14 " " " " " " " " 2.00

" 1-2 " 12 " " " " " " " " 2.00

Any other threads furnished. Odd threads extra price.

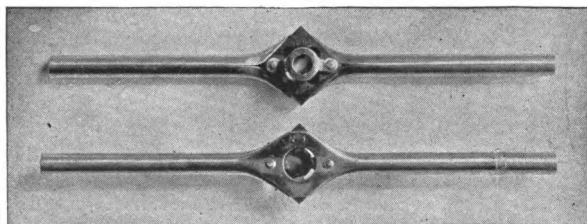
**D 276.****No. 3. Length 19 Inches.**

Cuts 9-16 in.; 12 threads. Complete, Stock, Die and Guide, with Tap, \$2.00

" 5-8 " 11 " " " " " " " " 2.50

" 3-4 " 10 " " " " " " " " 2.50

Any other threads furnished. Odd threads extra price.

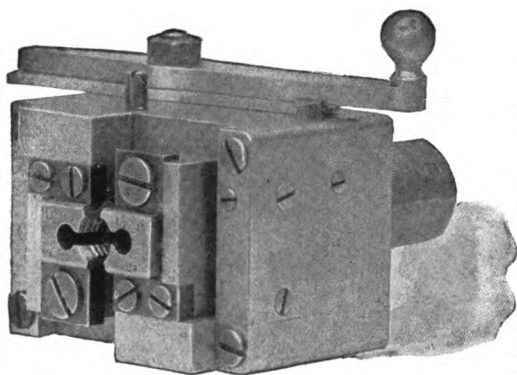
**D 277.****No. 4. Length 28 Inches.**

Cuts 7-8 in.; 9 threads. Complete, Stock, Die and Guide, with Tap, \$3.50

" 1 " 8 " " " " " " " " 3.50

Any other threads furnished. Odd threads extra price.

In ordering, state what thread is wanted; also whether exact size or over size.



GARDNER DIE HEAD.

D 278. '94 Model.

As stiff and rigid as a solid die. Will cut threads true to size. Wearing parts are few. Will not wear out quickly. Will not clog with chips. Will do as fine and close work as desired. Cost of extra dies small.

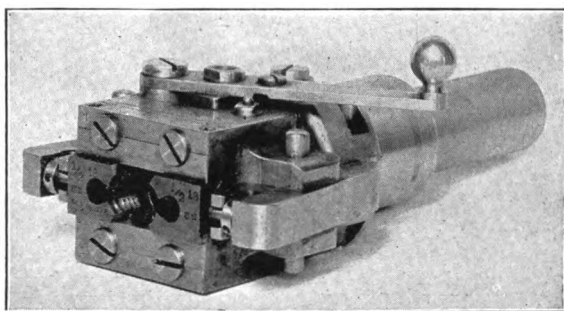
In the Gardner Die Head the slides or die carriers extend across the full length of Head thus giving long wearing surfaces and great rigidity.

The dies are closed by a taper pin forced into back of die carriers. The dies are forced open by spiral springs. "EXTRA SIZES" should not be used constantly except on brass, as the Head is not heavy enough to run on these extra sizes constantly.

No.	Cuts to	Extra Sizes.	Each.
0	1-2 inch	9-16 in. and 5-8 in.	\$45.00
1	3-4 "	7-8 " and 1 "	65.00
2	1 "	11-8 " and 1 1-4 "	75.00
3	1 1-4 "	13-8 " and 1 1-2 "	95.00

EXTRA DIES FOR GARDNER DIE HEADS.

No. 0.	Per pair ...	\$2.50	No. 2.	Per pair ...	\$3.50
No. 1.	" ...	3.00	No. 3.	" ...	4.00



D 279.

GARDNER DIE HEAD.

'95 Model.

Price as above,
same as '94
Model.



D 280.

THE LIGHTNING TAPS, DIES AND HOLDERS.

FOR USE IN THE BIT BRACE.—(STYLE B.)

Making perfect threads at a single cut. Sizes, 3-16 inch to 7-16 inch.

We sell a great many of these to pump makers. They are also extremely valuable on carriage work, and for many other purposes. Since we introduced them, thousands have gone into use in the best shops and given the highest satisfaction. They are very frequently kept in use even where there is a Lightning Screw Plate or Machine, as old bolts can often be re-cut without removing them from their places, and much trouble saved in taking work apart.

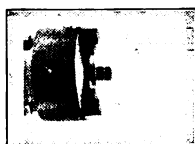
The Die is not solid, but in two pieces, and of the same construction as the Dies for our Bolt-cutting Machines. Each Die must have a holder of its own.

PRICES.

	3-16 in.	1-4 in.	5-16 in.	3-8 in.	7-16 in.
Die, Tap and Holder, complete....	\$1.90	1.90	1.95	2.25	2.35
Die only.....	1.00	1.00	1.00	1.00	1.15
Tap only.....	.50	.50	.55	.60	.70
Holders, separately, each.....					\$0.65

Unless otherwise ordered, we supply these Taps and Dies 1-32 oversize, V thread.

Gardner Grinder grinds flat and accurate, and most rapidly.

CUSHMAN'S CHUCKS.**D 281. GEARED SCROLL THREE-PINION CHUCK.**

This Chuck is operated with a key, and made very strong and durable. The Jaws are of wrought iron, case hardened, and the Scrolls are of forged wrought iron.

Price, including Keys and Screws.

**Gardner
Grinder
Grinds Fa**

PRICE LIST OF GEARED SCROLL CHUCKS.

Size, Inches.	Diameter of Hole, Inches.	Diameter of Face-Plate, Inches.	Price 3-Jaw.	Price 3-Jaw, Two-Sets.	Price 4-Jaw.	Price 4-Jaw, Two-Sets.	Extra Sets of 3-Jaws ordered with- out Chuck.	Extra Sets of 4-Jaws ordered with- out Chuck.
2½	¾	...	\$ 7.50	\$ 9.00	\$	\$	\$ 2.25	\$
3	¾	2½	10.00	12.00	11.00	13.60	3.00	4.00
4	¾	3½	12.00	14.40	13.20	16.40	3.75	5.00
5	¾	3½	15.00	18.00	16.50	20.50	4.50	6.00
6	1 ⅞	4½	18.00	21.60	19.80	24.60	5.50	7.80
7½	2	4½	20.00	24.00	22.00	27.30	6.75	9.00
9	2½	5½	24.00	28.80	26.40	32.80	9.00	12.00
10½	3	5½	27.00	32.40	29.70	37.00	10.50	14.00
12	3	7	30.00	36.00	33.00	41.00	12.00	16.00
15	3½	7	40.00	48.00	44.00	54.60	15.00	20.00

D 282.**BOX BODY CHUCKS.**

Box Body, Two-Jawed Brass Fitters' Chucks, furnished with either Connected or Independent Jaws. The Slip Jaws are pinned in. When ordering be particular and say if you want connected or independent Jaws.

**D 282.**

Diam., Inches.	Jaws take, Inches.	Height of Jaws, In.	Width of Jaws, In.	Price.
7	3	1½	1¾	\$24.00
9	4	2	2	30.00
12	6	2½	2½	36.00
15	8	...	...	42.00

D 283.**IMPROVED ROUND BODY TWO-JAWED CHUCKS.**

They are made to bolt to a face-plate in the ordinary way, have Universal Jaws, Independent Jaws, and Slip Jaws.

**D 283.**

Size. Inches	Jaws Take. Inches	Price. Round Body.	Extra Slip Jaws.	
			Iron. Per pair.	Cast Steel. Per pair.
4½	2	\$16.00	\$1.00	\$2.00
6	2½	20.00	1.00	2.00
7	3	24.00	1.00	2.00
9	4	30.00	1.25	3.00
12	6	36.00	1.25	4.00
15	8	.....	1.50	5.00

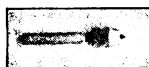
D 284.

This is a cut of the Slip Jaws, a pair of same being shown in the Box Body and Round Body Cuts of Chucks. These Jaws are kept in stock and furnished in any quantity at the following prices:

4¾ inch....per pair,	\$1.00	9 inch....per pair,	\$1.25
6 inch....per pair,	1.00	12 inch....per pair,	1.25
7 inch....per pair,	1.00	15 inch....per pair,	1.50

When wanted, Cast Steel will be furnished at the following prices:

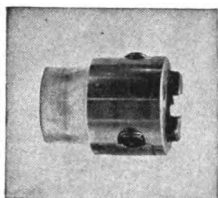
4¾ inch....per pair,	\$2.00	9 inch....per pair,	\$3.00
6 inch....per pair,	2.00	12 inch....per pair,	4.00
7 inch....per pair,	2.00	15 inch....per pair,	5.00

D 284.**D 285.****STAR CHUCK.**

- No. 1. 1-2 inch Shank, 2 inch long, holds Drills from 1-64 to 1-8 inch. Price, each, \$1.00
 No. 2. 5-8 inch Shank, 3 1-2 inch long, holds Drills from 1-32 to 1-4 inch. Price, each, 1.50

The Shanks (or Mandrels) are centred so they can easily be fitted to any Lathe desired. No. 3 holds Drills 1-16 to 1-2 inch. Price each, \$3.00.

D 286. WESTCOTT'S PATENT LITTLE GIANT IMPROVED DRILL CHUCK.



This Chuck has no projections. The jaws and screws are all within the body. The jaws are of the best tool steel, carefully hardened.

A guard ring prevents the jaws from being opened so as to take in larger work than the Chuck is designed for. It is very powerful, and is guaranteed to hold true and not to injure or shear the finest drill. It holds round or square work, and there is no chuck equal to it for holding wood-boring tools. The hole in the hub is made to fit the

Morse taper, but can be bored out and threaded to suit the customer's templet at small cost.

The jaws are guided by three strong gibs, which prevent their canting when taking a short bite.

Large-sized drill chucks are made with chamber for face-plate, but when a small sized drill chuck is required to be fitted for a face-plate, it is made with projection to fit chamber in face-plate. When fitted in the latter way, with a good stiff face-plate, as large in diameter as it is convenient to use, chuck is strengthened, and the methods employed proves to be a superior way of fitting up small drill chucks for face-plate.

Cannot guarantee fit in threading Drill Chucks from buyers' sketches and spindle measurements. Customers should furnish metal templet to thread by. We will thread the hub to fit an internal templet (duplicate of spindle) for 75 cents. If bushing is necessary, 50 cents extra will be charged for same. Do not send face-plate to thread by.

If you wish to cut a thread in the hub of the Little Giant Chuck for lathe spindle, by no means hold the chuck in another chuck, but screw the jaws down upon a perfectly true live center.

When threading Little Giant Chuck for lathe spindle, the hub should be cut off to same length as lathe-spindle nose, so as to not have chuck overhang, thus bringing work nearer to spindle bearing.

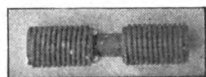
All parts are duplicated. The jaws by sets only.

No. 1 Little Giant Improved Chucks marked 3d month 1892 or later, hold $\frac{3}{4}$ -inch drill.

PRICE LIST OF LITTLE GIANT IMPROVED.—EXTRA STRONG SCREWS.

Gardner
Grinder
Grinds Flat
Surfaces.

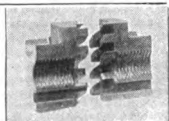
No.	Approximate Diameter.	Holding Drills.	Price.
00	$1\frac{1}{4}$ -inch.	0 to $\frac{1}{4}$ inch.	\$ 7.00
0	$2\frac{1}{2}$ "	0 to $\frac{1}{2}$ "	8.00
1	3 "	0 to $\frac{3}{4}$ "	9.00
2	$3\frac{1}{2}$ "	0 to 1 "	10.00
$2\frac{1}{2}$	4 "	0 to 1 " ex. strong.	11.00
3	6 "	0 to $1\frac{1}{2}$ "	18.00
4	$6\frac{1}{2}$ "	0 to 2 "	20.00
5	7 "	$\frac{1}{2}$ to $2\frac{3}{8}$ "	50.00
6	9 "	3 inch capacity.	60.00



D 287.

SCREWS AND JAWS FOR WESTCOTT'S PAT. LITTLE GIANT IMPROVED CHUCK.

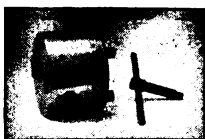
PRICE LIST.



Numbers.	Screws.	Jaws, per set.	Numbers.	Screws.	Jaws, per set.
00	\$1.00	\$2.00	3	\$2.50	\$5.00
0	1.00	2.25	4	3.00	6.25
1	1.00	2.50	5	3.50	8.00
2	1.10	2.75	6		
$2\frac{1}{2}$	1.50	3.50			

REMARKS.—The jaws are made and sold only in sets. All parts are interchangeable.

When ordering duplicate parts for Drill Chuck state whether chuck is stamped with a ★ or not. Also mention date stamped on face of chuck, and full name of Chuck stamped on side of same, i. e., whether Little Giant Improved, Little Giant Double Grip, or Oneida.

D 288. Nos. 3, 4, 5 AND 6 PATENT LITTLE GIANT IMPROVED DRILL CHUCK.

No.	Approximate Diameter.	Holding Drills.	Price.
3	6 inch.	0 to 1½ inch.	\$18.00
4	6½ " "	0 to 2 " "	20.00
5	7 " "	½ to 2½ " "	25.00
6	9 " "	3 inch capacity.	

These chucks are designed for hollow spindle lathes, screw machines, and turret head lathes, taking the place of the more costly lathe chucks which have been used for cutting off chucks.

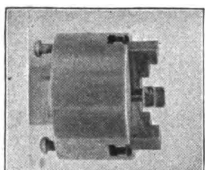
They are made with straight bodies only, and can be attached only by means of a face-plate; if it be desired to attach them by means of an arbor, the arbor must be screwed into the face-plate. It is much more desirable to dispense with arbor, attaching by means of face-plate alone, when drill press spindle is threaded for same.

When the lathe spindle is light and it is important that the chuck should not overhang, the center hole can be bored out so as to admit of reversing the face-plate, bringing the hub inside the chuck.

D 289. IMPROVED BENCH CENTERING CHUCK.

This is simply a scroll chuck with a steel center. It is made to fasten on a bench, and will perfectly center round, square and octagon stock, from ¼-inch to 1½-inch, and will operate quicker and with more satisfaction than anything ever yet produced for the purpose. It is made very strong, is always ready for use and will last a lifetime; and in an ordinary shop will pay for itself in less than three months. Some shops now have them in every room, and consider them almost indispensable. It is furnished at a very low price, but it is fully guaranteed in every respect.

Price, either three jaw or four jaw.....\$12.00

D 290. AMATEURS' GEARED SCROLL CHUCK.

This cut represents a new line of chucks designed for foot lathes and for general use. They are equally well made and of as good material as the regular Gearing Scroll chucks. Each chuck has one socket pinion which projects but little beyond the outside.

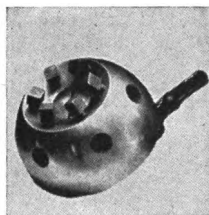
The 2-inch is furnished either to fit a taper arbor or face-plate. Be particular, when ordering, to mention which style is required. The 2½-inch is

made to attach to face-plate only.

Diameter, Inches.	Price with One Set of Jaws.	Price with Two Sets of Jaws.	Extra Sets of Jaws ordered without Chuck
2	\$6.00	\$7.50	\$2.25
2½	7.00	8.50	2.25

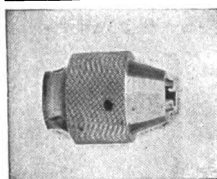
D 291.**TURRET HEAD.**

Parallel Clamps are Parallel.



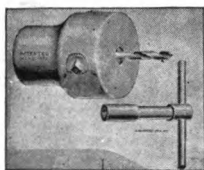
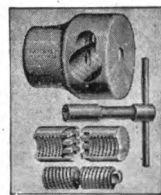
To be Used in Tail Stock of Lathe. Holds Six Tools.

	Diam.	Socket Holes.	Weight.	Price.
Small Size...	3½ in.	½ in. diam. 1 in. deep.	3¼ lbs.	\$13.00
Large Size...	5¼ " "	¾ " " 1½ " "	14 " "	25.00

D 292. THE ALMOND DRILL CHUCK.

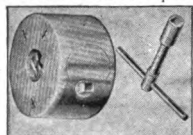
This Chuck will center and hold Drills with a firm grip, and is one of the best Chucks in the market.

To hold 0 to 3-16.....	\$5.50
To hold 0 to 5-16.....	5.50
To hold 0 to 1-2.....	8.50

D 293. THE HORTON NEW DRILL CHUCK.—Style B.**No. 1.****No. 2. Showing Parts.**

As shown by the engravings, this chuck is simple in construction, and very strong and durable in all of its parts; the body is composed of one piece of metal, and the entire chuck of but four pieces. The entire chuck in the $\frac{1}{4}$ and $\frac{1}{2}$ inch sizes is made of steel; in the larger sizes the working parts are of steel, and the jaws of all are thoroughly hardened. The teeth on bite of jaws are so constructed that there is no danger of breaking or crimping the drill by gripping, as in many chucks of this class. The right and left-hand screw which drives the jaws, is set deep into the latter, so that an end thrust with jaws is obtained, and consequently a stronger grip, with no danger of breaking the screw. The jaws are cylindrical, and the power of the jaw being applied more direct, there is no binding or canting of the jaw when taking a short bite, as is the case with two-jaw chucks made with the old-fashioned angular jaw, set in a rectangular slotted body.

N. B.—The $1\frac{1}{2}$ -inch and the 2-inch sizes are attached to spindle of machine by means of a face-plate and screws, the same as an ordinary lathe chuck.

**No. 3.**

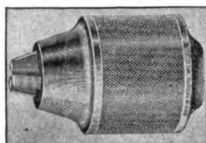
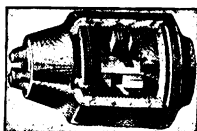
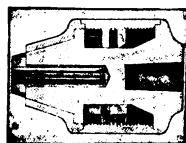
Cut No. 3 shows the $1\frac{1}{2}$ -inch and 2-inch B Chuck, front view. These chucks are the most POWERFUL GRIPPING chucks made, for reasons explained above. They can be used in many places where heretofore it has been necessary to have a more expensive chuck; particularly on cutting-off machines, screw machines, turret-head lathes, hollow spindle lathes, drill presses for heavy work, etc.

PRICE LIST OF DRILL CHUCKS.**PRICE LIST OF PARTS OF DRILL CHUCK.**

Approximate Diameter of Body.	Will hold Drill.	List Price.	Body.	Jaws, per pair	Screws, Each.	Wrench
Style No. 1	$1\frac{1}{8}$ in. 0 to $\frac{1}{4}$ in.	\$ 7.00	$\frac{1}{4}$ in.,	\$2.75	\$2.75	\$0.50
	$2\frac{3}{8}$ in. 0 to $\frac{1}{2}$ in.	8.00	$\frac{1}{2}$ in.,	3.00	3.00	1.25
	$2\frac{1}{2}$ in. 0 to $\frac{3}{4}$ in.	9.00	$\frac{3}{4}$ in.,	3.25	3.25	1.50
	$3\frac{1}{8}$ in. 0 to 1 in.	10.00	1 in.,	3.50	3.50	1.75
Style No. 3	$5\frac{1}{4}$ in. 0 to $1\frac{1}{2}$ in.	18.00	$1\frac{1}{2}$ in.,	6.50	6.50	3.50
	$6\frac{1}{4}$ in. 0 to 2 in.	20.00	2 in.,	7.00	7.00	4.00

D 294.**WEIR'S "MODEL" DRILL CHUCK.**

Positively Dust-Proof, Powerful Grip and Perfectly True Drill Chucks.

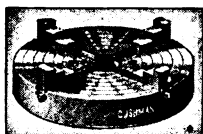
**Fig. 1.****Fig. 2.****Fig. 3.**

This Chuck has been placed on the market at a low figure to meet the general demand that calls for one that will run true and hold a drill from slipping. It is adapted for all rapid drilling and light turning where accuracy is required.

Figure 1 represents the outside view of the chuck with all parts complete; and Figures 2 and 3 represent the inside view, showing the construction and arrangements of parts. An exceedingly powerful grip is obtained by the greater length of jaws, and they acting independent of the knurled sleeve, the sleeve now acts as a check-nut and holds the jaws to the work. The strength of the chuck, and the ease with which it can be taken apart, are important features of the Weir Model Drill Chuck; no bushings or jaws to drive off or out; no screws to adjust, or nuts to become loose. Every part fits and is made to fit. All parts are interchangeable. It is positively dust-proof, as all of the working parts are completely encased. The jaws will grip sufficiently tight when operated by hand, although we furnish a spanner wrench.

We have held a one-inch drill with the shank reduced in a half-inch chuck, when only tightened down by hand, and drilled a hole in anything the drill would cut. It can be taken apart by unscrewing the cone end (left-hand thread) and next the knurled sleeve; then take out the lock ring, and the jaws can be easily removed. After the jaws are hardened they are ground perfectly true. For cutting or threading rod stock a hole the full capacity of the chuck may be drilled through the entire center without injury. We guarantee these chucks in every part. Order by numbers given below. Price list:

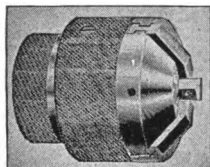
No. 1. Capacity, 0 to $1\frac{1}{2}$ in., each. \$5.50 | No. 2. Capacity, 0 to 1-2 in., each. \$9.00

CUSHMAN'S CHUCKS.**D 297.****D 297. INDEPENDENT FOUR-JAW CHUCK.**

The Jaws are fitted so they can be changed end for end. In the large sizes slots are cast in the face between the Jaws, so that difficult pieces can be secured to the Chuck by bolts. The Screws are steel, and the Jaws wrought iron, case hardened.

Cushman's and Whiton's same price. including Keys and Bolts.

Diameter.	Diameter of Hole.	Diameter of Face-Plate.	Price.
8 Inches	1 7-8 Inches.	4 3-4 Inches.	\$24.00
9 "	1 7-8 " "	4 3-4 " "	26.00
10 "	2 " "	4 3-4 " "	28.00
12 "	2 7-8 " "	6 11-16 " "	33.00
14 "	3 " "	6 11-16 " "	37.00
15 "	3 " "	6 11-16 " "	39.00
16 "	3 " "	6 11-16 " "	42.00
18 "	4 " "	7 13-16 " "	48.00
20 "	4 " "	7 13-16 " "	54.00
21 "	4 " "	7 13-16 " "	59.00
22 "	4 3-4 " "	9 1-2 " "	62.00
24 "	4 3-4 " "	9 1-2 " "	70.00
26 "	4 3-4 " "	9 1-2 " "	80.00

D 298.**CUSHMAN'S ACME DRILL CHUCK.**

This is the same Chuck we have sold for many years by the name of "Four Dollar Drill Chuck," and is the best drill chuck for the price ever made. We have changed the design and improved the chuck in many ways.

It is made of steel, in the most thorough manner, and holds from 0 to $\frac{1}{2}$ inch true and firm. It is a self-tightening chuck and needs no spanner wrench to make it hold. Price.....\$4.00

D 299.**CUSHMAN'S HARTFORD DRILL CHUCK.**

This Chuck is made mostly of cast steel.

It does not injure the drill in any way.

This is the best Chuck made to hold wood-boring tools, and will hold taps and reamers by the square, or by the round, part.

They are all made with a taper hole, but can be bored out and threaded to fit small lathe spindles.

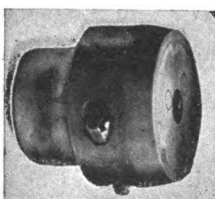
			Extra Jaws.
			Extra Screws. Per pair.
No. 0, holds 0 to $\frac{1}{4}$	\$6.00	No. 0.....	\$0.80 \$2.00
No. 1, holds 0 to $\frac{1}{2}$	7.00	No. 1.....	1.00 2.25
No. 2, holds 0 to $\frac{3}{4}$	8.00	No. 2.....	1.20 2.50

**D 300. TRUMP CHUCK.**

No. 1, holds to $\frac{1}{8}$ inch..... \$1.50

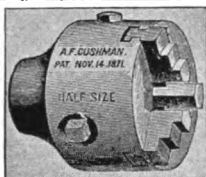
No. 2, holds to $\frac{1}{4}$ inch..... 2.50

No. 3, holds to $\frac{3}{8}$ inch..... 4.50

**D 301. LITTLE HERCULES DRILL CHUCK.**

No.	Diameter. Inches.	Holding Drill. Inches.	Price.
1	1 5-8	0 to 5-16	\$ 7.00
1 1-2	2 3-8	0 to 1-2	8.00
2	2 3-4	0 to 5-8	9.00
3	3 1-2	0 to 13-16	10.00
4	4	0 to 1 1-16	11.00

The Little Hercules, as illustrated, is a Chuck well known and has many friends. It has three rotating jaws, pivoted at their ends as shown. The formation of the jaws is such that they rotate eccentrically, and the pressure of the work upon them tends to tighten the drill or tool within the jaws. The jaws are rotated by engaging an internal hardened steel ring that is driven by a side screw. Serrated Jaws.

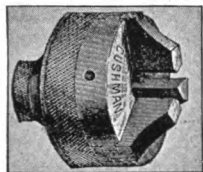
**CUSHMAN'S CHUCKS.**

Badger
Die Stock
are Non-
Adjustable

D 302. KEY DRILL CHUCK.

We usually furnish them with No. 1 or No. 2 Jaws, or both.

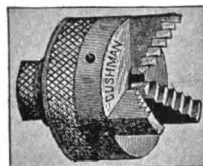
Price, with one set of Jaws..... \$8.00
Price, with two sets of Jaws 9.50

**D 303. CUSHMAN'S PEERLESS.**

A new Drill Chuck, and one of the best Chucks for the price ever put on the market.

Holds Drills from 0 to 1-2 inch.

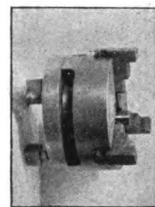
Price..... \$4.00

**CUSHMAN'S JEWELERS' LATHE CHUCKS.****D 304. DIAMETER, 2 INCHES.**

This Chuck is the same every way as the Peerless Drill Chuck, only the Jaws are made especially for Watch and Clock Makers' and Repairers' use. Extra pains are taken to have this Chuck perfectly fitted and to run true.

They have been in use some time, and in no instance have parties been dissatisfied with them.

Price..... \$4.50

**D 305. CUSHMAN'S HARTFORD LEVER CHUCK.**

This is a well-made Chuck of the best material, and is suitable for all kinds of Machinists' work, Amateur Lathes, and for Drill Chucks. They are all made to fit a Taper Arbor; the 3 and 4 inch can be fastened to a Face-Plate, and any of them can be bored and threaded to screw on to the spindle of Lathe.

They are furnished with all the various styles of Jaws, and with Screws and Lever.

Diameter, 2 inches, one set of Jaws..... \$4.00 Two sets of Jaws..... \$5.50
" 3 " " " " 5.00 " " " 6.50
" 4 " " " " 6.00 " " " 7.50

State in your order if you want No. 1, No. 2, or two sets of Jaws.

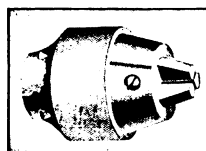
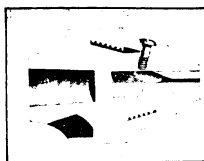
D 306. PLUG ARBOR FOR CUSHMAN'S DRILL CHUCKS.

These Arbors are made to fit all Cushman's Drill Chucks, also the 2 inch and 2½ inch Amateur Chucks. Lathe end left blank.

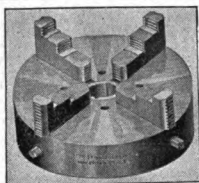
Price..... \$1.00

D 307. CUSHMAN'S AMATEUR LEVER CHUCKS.

Diameter, Inches.	Price with One Set of Jaws.	Price with Two Sets of Jaws.	Extra Sets of Jaws ordered without Chuck.
2	\$4.50	\$5.75	\$1.85
3	5.50	6.75	1.85
4	6.50	8.00	2.25
5	7.50	9.00	2.25

D 308, 309. SKINNER "NEW MODEL" DRILL CHUCK.**D 308.****D 309.**

Price.
No. 11. Capacity,
0 to 7-32 \$5.50
No. 12. Capacity,
0 to 11-32 5.50
No. 13. Capacity,
0 to 17-32 9.00



D 310.

SKINNER FOUR-JAW INDEPENDENT LATHE CHUCK.

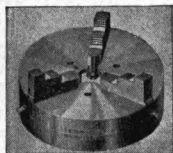
We furnish at reasonable price, Face-Plate Castings with our Chucks, when desired.

Write for general catalogue describing full line of Skinner Chucks.

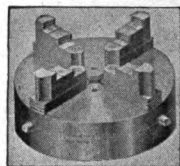
Price List—With Reversible Jaws.

Order by these Numbers.	Diameter of Chuck Body.	Diameter of Hole Through Center.	Diameter of Recess for Face-Plate.	Price.
104.....	4 9-16 inch.	$\frac{3}{4}$ inch.	$2\frac{3}{4}$ inch.	\$14.00
106.....	6 7-16 "	$1\frac{1}{4}$ "	4 "	18.00
108.....	8 "	$1\frac{1}{2}$ "	4 "	22.00
110.....	10 "	$1\frac{3}{4}$ "	$4\frac{3}{4}$ "	26.00
112.....	$12\frac{3}{8}$ "	2 "	6 "	30.00
114.....	14 "	$2\frac{3}{8}$ "	7 "	34.00
116.....	16 "	$2\frac{3}{4}$ "	$7\frac{3}{4}$ "	38.00
118.....	18 "	3 "	8 "	44.00
120.....	20 "	3 "	10 "	50.00
122.....	22 "	3 "	12 "	57.00
124.....	24 "	3 "	12 "	65.00
126.....	26 "	3 "	13 "	80.00
128.....	28 "	3 "	14 "	100.00
130.....	30 "	$3\frac{3}{4}$ "	15 "	120.00
136.....	36 "	$3\frac{3}{4}$ "	18 "	210.00
* 142.....	36 "	$3\frac{3}{4}$ "	18 "	240.00

*This Chuck (No. 142) measures 36 in. diameter, but has a capacity of 42 inches.

**SKINNER COMBINATION LATHE CHUCKS.**

DIMENSIONS AND CAPACITY
SKINNER UNIVERSAL AND
COMBINATION LATHE CHUCKS.

Three and Four Jaws.

Perfect
Cups for
Helmet

D 311. Three Jaws.

Size Chuck.	Price.	Size Chuck.	Price.
3 inch.	\$18.00	18 inch.	\$62.00
4 "	22.00	21 "	80.00
5 "	25.00	24 "	100.00
6 "	26.00	26 "	130.00
8 "	30.00	30 "	170.00
9 "	34.00	36 "	230.00
12 "	44.00	42 "	270.00
15 "	52.00		

D 312. Four Jaws.

Size Chuck.	Price.	Size Chuck.	Price.
4 inch.	\$26.00	18 inch.	\$75.00
5 "	30.00	21 "	95.00
6 "	32.00	24 "	120.00
8 "	38.00	26 "	160.00
9 "	42.00	30 "	200.00
12 "	56.00	36 "	285.00
15 "	64.00	42 "	325.00

DIMENSIONS AND CAPACITY.

Size of Chuck. Inches.	Diam. of Chuck B'dy Inches.	Capacity with Com'on Jaws. Inches.	Diam. Face Plate Seat. Inches.	* Diam. of Center Hole Inches.
4	$3\frac{5}{8}$	$3\frac{5}{8}$	1 15-16	$\frac{3}{4}$
5	$4\frac{7}{8}$	$4\frac{7}{8}$	$2\frac{3}{4}$	15-16
6	$6\frac{1}{4}$	$5\frac{3}{4}$	$3\frac{1}{2}$	$1\frac{1}{4}$
8	$8\frac{3}{8}$	$6\frac{3}{4}$	$3\frac{1}{2}$	$1\frac{1}{4}$
9	$9\frac{5}{8}$	$8\frac{3}{8}$	$4\frac{1}{2}$	$1\frac{1}{2}$
12	$12\frac{1}{2}$	$10\frac{1}{4}$	5	$1\frac{1}{2}$
15	$15\frac{1}{4}$	13	$6\frac{3}{8}$	$1\frac{5}{8}$
18	17	$16\frac{1}{4}$	7	2
21	20	$19\frac{1}{4}$	8	$2\frac{1}{2}$
24	$21\frac{5}{8}$	$22\frac{3}{4}$	$8\frac{3}{4}$	$2\frac{1}{2}$
26	26	$25\frac{3}{4}$	10	$2\frac{3}{4}$
30	$30\frac{1}{4}$	30	13	3
36	$35\frac{5}{8}$	$33\frac{1}{4}$	15	3
42	....	$38\frac{3}{4}$	18	3
		$42\frac{1}{2}$	18	3

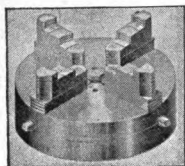
PRICE LIST OF PARTS, LATHE CHUCKS.

Size Ch'k Inch.	Chu'k Jaws. Each.	Pinion Screws. Each.	Circ'lar Racks. Each.	Wrenches. Each.
3	\$2.00	\$1.75	\$1.75	\$0.75
4	2.65	1.75	1.75	.80
5	2.80	2.00	2.00	.85
6	3.00	2.00	2.00	.90
8	3.30	2.75	2.75	.95
9	3.70	2.75	2.75	1.00
12	4.25	3.25	3.25	1.20
15	5.65	4.00	4.00	1.50
18	6.50	4.75	5.75	1.80
21	8.50	5.80	7.00	2.10
24	11.00	6.75	9.00	2.30
26	13.00	8.00	11.00	2.60
30	18.50	12.00	14.00	2.90
36	26.00	15.00	18.00	3.60

*We can make larger center hole in Chucks than sizes given in table if desired.

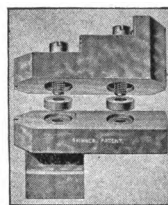
SKINNER UNIVERSAL LATHE CHUCK.

Reversible Jaw Chuck. Style J.

**D 313.**

D 313 represents a Skinner Four Jaw Universal Lathe Chuck with Patent Reversible Jaws.

D 314 represents Skinner Patent Reversible Jaw in detail, showing lower section solid with jaw nut, the upper section having a bearing the entire length on lower part.

**D 314.**

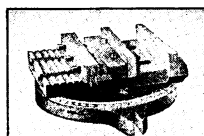
The Jaw is very simple in construction, and may be quickly reversed, and is practically as strong as a solid jaw, the strain coming entirely on the hardened steel dowels. It is made accurately, all parts being ground together after hardening. Chucks furnished with this Reversible Jaw have the same holding capacity as Chucks furnished with common jaws, but these jaws may be extended by moving the upper section outward so that the inner dowel of the top section shall fit into the outer recess of the lower section, in which case the capacity of the Chuck is very greatly increased. The Chuck is used many times with the upper section of jaw left off for cutting-off stock.

D 315. Price Three Jaws.

Size Chuck.	Price.	Size Chuck.	Price.
3 inch.	\$18.00	18 inch.	\$62.00
4 "	22.00	21 "	80.00
5 "	25.00	24 "	100.00
6 "	26.00	26 "	130.00
8 "	30.00	30 "	170.00
9 "	34.00	36 "	230.00
12 "	44.00	42 "	270.00
15 "	52.00		

D 313. Price Four Jaws.

Size Chuck.	Price.	Size Chuck.	Price.
4 inch.	\$26.00	18 inch.	\$75.00
5 "	30.00	21 "	95.00
6 "	32.00	24 "	120.00
8 "	38.00	26 "	160.00
9 "	42.00	30 "	200.00
12 "	56.00	36 "	285.00
15 "	64.00	42 "	325.00

SKINNER IMPROVED PLANER CHUCKS.

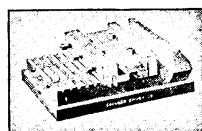
ADAPTED FOR USE

ON

PLANERS, SHAPERS,
MILLING MACHINES

AND

UPRIGHT DRILLS.

Gardner
Grinder
Flats.**D 316. Round Swivel Base.****D 317. Square Base.**

These Chucks are heavy and strong, are accurately made of the best materials, and have a greater capacity than any other. Set screws and holding strips are made of crucible steel, and the ends of set screws are hardened. All nuts are thoroughly case-hardened. A strip of tool steel is fitted to the movable jaw to take the thrust of the set screws. A drop forged steel wrench is furnished with each Chuck.

These Chucks will hold either straight or taper work, and can be instantly adjusted from 0 to greatest capacity, no blocking or packing being necessary. The movable jaw will not tip back or raise work from the bed.

A rib $1\frac{1}{8}$ inches wide is cast on the bottom of all Round Base Chucks for fitting to slots in Planer Table. We can arrange the base of these Chucks to attach to a variety of styles and makes of machines, as desired. All Round Base Chucks are accurately graduated.

D 316. Price Round Swivel Base Planer Chuck.

Size Chuck, No.	Price.	Length of Jaw, Inches.	Depth of Jaw, Inches.	Jaws will Open, Inches.	Space Required, Inches.
6	\$25.00	7	$1\frac{1}{2}$	$3\frac{1}{2}$	10
8	30.00	9	$1\frac{3}{8}$	5	$12\frac{1}{2}$
10	36.00	11	$2\frac{3}{8}$	6	$14\frac{1}{2}$
12	40.00	13	$2\frac{3}{8}$	8	$16\frac{3}{4}$
15	50.00	$15\frac{1}{2}$	$2\frac{1}{2}$	$9\frac{1}{2}$	20
18	60.00	$18\frac{1}{2}$	$2\frac{3}{4}$	$11\frac{1}{4}$	23
24	90.00	$24\frac{1}{4}$	$2\frac{3}{4}$	16	27
30	120.00	$30\frac{3}{4}$	$2\frac{3}{4}$	$21\frac{1}{2}$	34

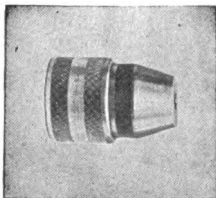
D 317. Price Square Base Planer Chuck.

Size Chuck, No.	Price.	Space Req'd, Inches.
6	\$20.00	$7\frac{1}{4} \times 11$
8	25.00	$9 \times 12\frac{1}{2}$
10	30.00	11×15
12	35.00	13×17
15	45.00	$15\frac{1}{2} \times 21$
18	55.00	$18\frac{1}{2} \times 24$
24	75.00	$24\frac{1}{4} \times 28$
30	100.00	$30\frac{3}{4} \times 34$

Write for general catalogue describing full line of Skinner Chucks.

DRILL CHUCKS.**D 318.****BEACH PATENT DRILL CHUCK.**

No. 0.	Holding from 0 to 1-8 inch diameter, (for Jewelers).....	\$8.00
No. 1.	Holding 1-16 to 1-4 inch diameter ...	8.00
No. 2.	Holding 1-16 to 3-8 inch diameter ...	8.50
No. 3.	Holding 1-16 to 1-2 inch diameter....	10.00
No. 4.	Holding 3-16 to 5-8 inch diameter ...	11.00

D 319.**STETSON'S PATENT CHUCK.**

This construction has advantages over the old style, in that the Jaws are stronger, and move in that part of the Chuck which is attached to the driving spindle. Great firmness is gained to the Chuck by this arrangement.

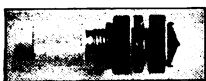
The threaded and working parts of the Chuck are covered, and thereby secured from injury or dirt. But one size will at present be made.

No. 2, holding from 0 to 3-8 inch..... \$8.50

D 320.**CENTER DRILL CHUCK.**

This Chuck is made of Steel, has hardened Jaws, and will hold one size Drill only, in sizes from 1-16 to 5-16 inch diameter.

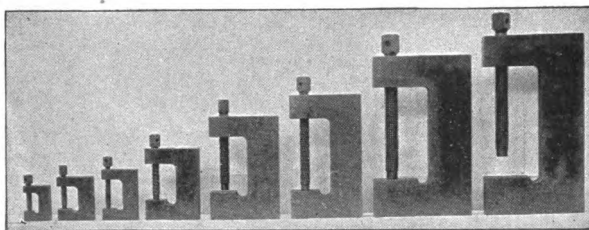
Price each Chuck..... \$2.50
Arbor for Center Drill Chuck, without nut... .80

**D 321. PRATT & WHITNEY CENTER DRILL CHUCK.**

Size 0 to 1-4 inchprice each, \$5.00

**D 322.****GARDNER ROD VISE.**

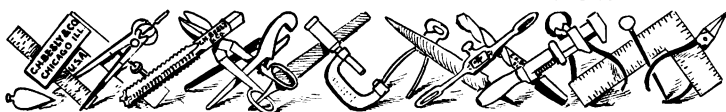
Holds Rod from 3-16 to 1 inch. Price.... \$4.50

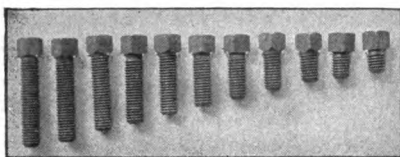
D 323.**PARALLEL CLAMPS.****All Steel and Case-Hardened.**

These Flat and Parallel Surfaces done on Gardner Grinder.

All surfaces are either parallel or at right angles to each other. Articles held in these clamps may have holes drilled parallel to each other, or at right angles to each other, without being removed from clamps. Articles held in these clamps may have surfaces generated parallel or at right angles to each other, without being removed from clamps.

Sizes.	Weight.	Each.	Sizes.	Weight.	Each.
1 inch.....	4½ ozs....	\$0.75	3 inches, extra heavy. 4½ lbs....		\$2.75
1¼ inches.....	8 ".....	1.00	4 ".....	5 ".....	3.00
1⅝ ".....	9 ".....	1.25	4 ".....	extra heavy. 11 ".....	4.00
2 ".....	1⅞ lbs....	1.75	5 ".....	11½ ".....	5.00
3 ".....	2.00		6 ".....	11¾ ".....	6.00





D 324.

IRON SET SCREWS.

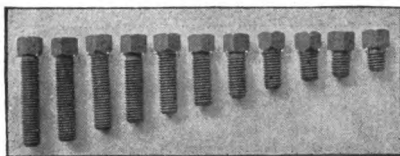
Case-Hardened.

PRICE PER HUNDRED.

Fine Tools
Our
Specialty.

Diameter of Screw.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Length under Head to Extreme Point.												
$\frac{3}{4}$	\$2.00	\$2.20	\$2.50	\$2.90	\$3.40	\$4.25	\$ 5.00	.....	.....	.....	.....	.....
1	2.15	2.35	2.65	3.10	3.60	4.25	5.00	7.00	.....	.....	.....	.....
$1\frac{1}{4}$	2.30	2.50	2.80	3.30	3.80	4.50	5.25	7.00	\$11.30	.....	.....	.....
$1\frac{1}{2}$	2.45	2.65	2.95	3.50	4.00	4.75	5.50	7.50	11.30	\$14.90	.....	.....
$1\frac{3}{4}$	2.60	2.80	3.10	3.70	4.20	5.00	5.75	8.00	12.00	15.90	\$19.50	.....
2	2.80	3.00	3.30	3.95	4.45	5.30	6.05	8.60	12.90	17.00	21.10	\$25.30
$2\frac{1}{4}$	3.05	3.25	3.55	4.25	4.75	5.65	6.40	9.30	13.80	18.40	22.90	27.40
$2\frac{1}{2}$	3.30	3.55	3.85	4.60	5.10	6.05	6.80	10.00	14.80	19.80	24.70	29.60
$2\frac{3}{4}$	3.55	3.85	4.20	5.00	5.50	6.50	7.25	10.80	15.90	21.40	26.70	32.00
3	3.80	4.15	4.55	5.45	5.95	7.00	7.75	11.70	17.10	23.00	28.80	34.60
$3\frac{1}{4}$	.....	4.45	4.90	5.90	6.45	7.55	8.35	12.70	18.40	24.70	31.00	37.40
$3\frac{1}{2}$	.....	.....	5.25	6.35	6.95	8.10	8.95	13.70	19.70	26.40	33.20	40.20
$3\frac{3}{4}$	.....	.....	.....	6.80	7.45	8.65	9.55	14.70	21.00	28.10	35.40	43.00
4	.....	.....	.....	.....	7.95	9.20	10.15	15.70	22.30	29.80	37.60	45.80
$4\frac{1}{4}$	.....	.....	.....	.....	.....	9.75	10.75	16.70	23.60	31.50	39.80	48.60
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	11.35	17.70	24.90	33.20	42.00	51.40
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	18.70	26.20	34.90	44.20	54.20
5	.....	.....	.....	.....	.....	.....	.....	.....	27.50	36.60	46.40	57.00
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each $\frac{1}{4}$ inch.	.25	.30	.35	.45	.50	.55	.60	1.00	1.30	1.70	2.20	2.80

We fill orders with Cup point Screws unless advised to the contrary, but are prepared to furnish either Oval, Flat, Conical or Dog Screw point at short notice. Also Hanger Screws. We make Set and Cap Screws any length up to 9 inches.



D 325.

STEEL SET SCREWS.

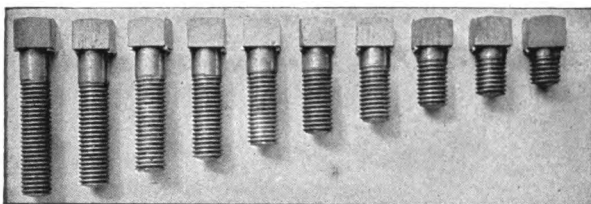
Tempered.

PRICE PER HUNDRED.

Diameter of Screw.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Length under Head to Extreme Point.												
$\frac{3}{4}$	\$2.50	\$2.75	\$3.10	\$3.60	\$4.25	\$ 5.30	\$ 6.25	.....	.....	.....	.....	.....
1	2.65	2.90	3.30	3.90	4.50	5.30	6.25	8.75	.....	.....	.....	.....
$1\frac{1}{4}$	2.85	3.10	3.50	4.15	4.75	5.60	6.55	8.75	\$14.10	.....	.....	.....
$1\frac{1}{2}$	3.05	3.30	3.70	4.40	5.00	5.90	6.90	9.35	14.10	\$18.60	.....	.....
$1\frac{3}{4}$	3.25	3.50	3.90	4.65	5.25	6.25	7.25	10.00	15.00	19.80	\$24.40	.....
2	3.50	3.75	4.15	4.95	5.55	6.60	7.60	10.75	16.10	21.25	26.35	\$31.60
$2\frac{1}{4}$	3.80	4.05	4.45	5.30	5.90	7.05	8.00	11.60	17.25	23.00	28.60	34.25
$2\frac{1}{2}$	4.10	4.45	4.80	5.75	6.35	7.55	8.50	12.50	18.50	24.70	30.85	37.00
$2\frac{3}{4}$	4.45	4.80	5.25	6.20	6.85	8.10	9.05	13.50	19.85	26.65	33.40	40.00
3	4.75	5.20	5.70	6.75	7.45	8.75	9.70	14.60	21.35	28.75	36.00	43.25
$3\frac{1}{4}$	.....	5.55	6.10	7.30	8.05	9.45	10.45	15.85	23.00	30.85	38.75	46.75
$3\frac{1}{2}$	.....	.....	6.55	7.90	8.70	10.15	11.20	17.10	24.60	33.25	41.50	50.25
$3\frac{3}{4}$	.....	.....	.....	8.50	9.35	10.85	11.95	18.35	26.25	35.15	44.30	53.75
4	.....	.....	.....	.....	9.95	11.50	12.70	19.60	27.85	37.25	47.00	57.25
$4\frac{1}{4}$	.....	.....	.....	.....	.....	12.20	13.45	20.85	29.50	39.40	49.75	60.75
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	14.20	22.10	31.00	41.50	52.50	64.30
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	23.40	32.75	43.60	55.25	67.95
5	.....	.....	.....	.....	.....	.....	.....	.....	34.40	45.75	58.00	71.25
Threads to inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for each $\frac{1}{4}$ inch.	.35	.40	.50	.60	.70	.80	.90	1.30	1.75	2.30	3.00	3.75

We fill orders with Cup point Screws unless advised to the contrary, but are prepared to furnish either Oval, Flat, Conical or Dog Screw point at short notice. Also Hanger Screws. We make Set and Cap Screws any length up to 9 inches.





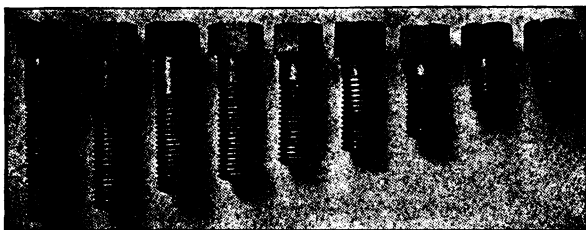
D 326.

SQUARE CAP SCREWS.

PRICE PER
HUNDRED.

Diam. of H'd.	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$1\frac{1}{8}$	$\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{5}{8}$	$1\frac{7}{8}$	2
L'gth of H'd.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Diam. Screw	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Length under Head to Extreme Point.														
$\frac{1}{8}$	\$2.40	\$2.75	\$3.20	\$3.80	\$4.40	\$5.75	\$7.70	.....	.....	.....	.....	.....	.....	.....
1	2.60	2.95	3.40	4.00	4.70	5.75	7.70	.....	.....	.....	.....	.....	.....	.....
$1\frac{1}{4}$	2.75	3.10	3.65	4.20	4.95	6.05	7.70	\$10.50	.....	.....	.....	.....	.....	.....
$1\frac{1}{2}$	2.90	3.30	3.85	4.45	5.25	6.35	8.25	10.50	\$14.00	.....	.....	.....	.....	.....
$1\frac{3}{8}$	3.05	3.50	4.10	4.70	5.55	6.65	8.80	11.10	14.80	\$18.00	.....	.....	.....	.....
2	3.25	3.70	4.35	4.95	5.90	7.05	9.40	11.80	15.70	19.00	\$22.50	.....	.....	.....
$2\frac{1}{4}$	3.50	4.00	4.65	5.25	6.30	7.55	10.10	12.60	16.70	20.20	24.00	\$30.00	.....	.....
$2\frac{1}{2}$	3.75	4.35	5.00	5.60	6.75	8.15	10.90	13.50	17.80	21.50	25.80	32.00	\$39.00	.....
$2\frac{3}{4}$	4.00	4.70	5.45	6.00	7.25	8.85	11.80	14.60	19.10	23.10	27.90	34.20	\$41.50	.....
3	4.25	5.05	5.90	6.55	7.80	9.65	12.80	15.90	20.60	25.00	30.50	37.00	\$45.00	.....
$3\frac{1}{4}$	.....	5.40	6.35	7.10	8.45	10.55	14.00	17.40	22.40	27.80	33.50	40.50	\$49.00	.....
$3\frac{1}{2}$	.....	.....	6.80	7.65	9.10	11.45	15.20	18.90	24.20	29.60	36.50	44.00	\$53.00	.....
$3\frac{3}{4}$	.....	.....	.....	8.20	9.75	12.35	16.40	20.40	26.00	31.90	39.50	47.50	\$57.00	.....
4	.....	.....	.....	.....	10.40	13.25	17.60	21.90	27.80	34.20	42.50	51.00	\$61.00	.....
$4\frac{1}{4}$	.....	.....	.....	.....	.....	14.15	18.80	23.40	29.60	36.50	45.50	54.50	\$65.00	.....
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	20.00	24.90	31.40	38.80	48.50	58.00	\$69.00	.....
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	26.40	33.20	41.10	51.50	61.50	\$73.00	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	35.00	43.40	54.50	65.00	\$77.00	.....
Thr'ds to in.	20	18	16	14	12	12	11	10	9	8	7	7	6	6
Add for each $\frac{1}{4}$ inch.	.25	.35	.45	.55	.65	.90	1.20	1.50	1.80	2.30	3.00	3.50	4.00	4.00

Helmet O
Lubricate
Anything



D 327.

HEXAGON CAP SCREWS.

PRICE PER
HUNDRED.

Diam. of H'd.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{5}{8}$	$1\frac{7}{8}$	2
L'gth of H'd.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Diam. Screw.	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Length under Head to Extreme Point.														
$\frac{1}{8}$	\$3.00	\$3.25	\$3.75	\$4.40	\$5.50	\$7.00	.....	.....	.....	.....	.....	.....	.....	.....
1	3.25	3.50	4.00	4.70	5.70	7.00	\$9.50	.....	.....	.....	.....	.....	.....	.....
$1\frac{1}{4}$	3.50	3.75	4.25	5.00	6.00	7.50	9.50	\$12.20	.....	.....	.....	.....	.....	.....
$1\frac{1}{2}$	3.75	4.00	4.50	5.30	6.30	8.00	10.00	12.20	\$16.00	.....	.....	.....	.....	.....
$1\frac{3}{8}$	4.00	4.25	4.75	5.60	6.60	8.50	10.60	12.80	16.60	\$21.20	.....	.....	.....	.....
2	4.25	4.60	5.05	5.95	7.00	9.10	11.20	13.40	17.20	22.30	\$29.00	\$37.50	.....	.....
$2\frac{1}{4}$	4.55	5.00	5.40	6.35	7.50	9.70	11.90	14.10	17.90	23.60	30.50	39.30	.....	.....
$2\frac{1}{2}$	4.85	5.40	5.80	6.80	8.00	10.40	12.70	14.90	18.80	25.10	32.30	41.40	.....	.....
$2\frac{3}{4}$	5.15	5.80	6.30	7.30	8.60	11.20	13.60	15.90	20.00	26.90	34.40	44.00	.....	.....
3	5.45	6.20	6.80	7.90	9.30	12.10	14.70	17.00	21.80	29.00	37.00	47.50	.....	.....
$3\frac{1}{4}$	.....	6.60	7.30	8.50	10.30	13.10	16.00	18.60	23.80	31.40	40.00	51.50	.....	.....
$3\frac{1}{2}$	.....	.....	7.80	9.10	10.90	14.10	17.30	20.20	25.80	33.80	43.00	55.50	.....	.....
$3\frac{3}{4}$	.....	.....	.....	9.70	11.70	15.10	18.60	21.80	27.80	36.20	46.00	59.50	.....	.....
4	.....	.....	.....	.....	12.50	16.10	19.90	23.40	29.80	38.60	49.00	63.50	.....	.....
$4\frac{1}{4}$	.....	.....	.....	.....	.....	17.10	21.20	25.00	31.80	41.00	52.00	67.50	.....	.....
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	22.50	26.60	33.80	43.40	55.00	71.50	.....	.....
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	28.20	35.80	45.80	58.00	75.50	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	37.80	48.20	61.00	79.50	.....	.....
Thr'ds to in.	20	18	16	14	12	12	11	10	9	8	7	7	6	6
Add for each $\frac{1}{4}$ inch.	.30	.40	.50	.60	.80	1.00	1.30	1.60	2.00	2.40	3.00	4.00	4.00	4.00



MACHINE SCREWS.



D 328. Round Head.



D 329. Flat Head.

D 328-329. IRON MACHINE SCREWS.—Per Gross.

Thr'ds Per In.	5 6	4 8	32, 36 40		30, 32			24, 30 32		20, 24		16, 18 20	16, 18			14, 16			
No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
Inch.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
$\frac{3}{16}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{1}{4}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{5}{16}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{3}{8}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{7}{8}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{1}{2}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{9}{16}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{5}{8}$	23	23	23	24	24	25	27	29	32	36	45	55	60	65	70	75	80	85	90
$\frac{11}{16}$	25	25	26	27	29	31	34	36	38	43	48	55	60	65	70	75	80	85	90
$\frac{13}{16}$	27	30	32	34	36	38	40	42	44	48	53	60	67	75	80	85	90	95	110
$\frac{15}{16}$	27	30	32	34	36	38	40	42	44	48	53	60	67	75	80	85	90	95	110
1	33	35	37	39	41	43	46	48	51	58	65	73	81	91	105	115	130	145	165
$1\frac{1}{8}$	37	39	41	43	45	47	50	53	56	63	70	79	89	100	110	125	140	155	175
$1\frac{1}{4}$	41	43	45	47	49	51	54	57	60	68	76	85	95	105	120	135	150	170	190
$1\frac{3}{8}$	46	48	50	52	54	56	59	62	65	73	81	90	100	110	125	140	155	175	205
$1\frac{1}{2}$	51	53	55	57	59	61	64	67	70	78	86	95	105	115	130	145	165	185	205
$1\frac{5}{8}$	60	62	64	66	68	70	73	76	79	87	95	105	115	125	140	155	175	200	225
$1\frac{3}{4}$	65	67	69	71	73	75	78	81	84	92	100	110	120	130	145	160	180	210	270
2	65	67	69	71	73	75	78	81	84	92	100	110	120	130	145	160	180	210	270
$2\frac{1}{4}$	75	80	85	90	95	100	110	120	130	140	150	160	170	180	200	225	255	285	320
$2\frac{1}{2}$	110	120	130	140	150	160	170	180	190	200	225	255	285	320	360	400	450	505	535
$2\frac{3}{4}$	125	135	150	160	170	180	190	200	225	255	285	320	360	400	450	505	570	635	685
3	135	145	155	165	175	185	195	205	225	255	285	320	360	400	450	505	570	635	685
Diameter About.	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$

D 330. BRASS MACHINE SCREWS.—Per Gross.

Thr'ds Per In.	5 6	4 8	32, 36 40		30, 32			24, 30 32		20, 24		16, 18 20	16, 18			14, 16			
No.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
Inch.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
$\frac{3}{16}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{1}{4}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{5}{16}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{3}{8}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{7}{8}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{1}{2}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{9}{16}$	29	29	29	31	33	38	45	52	60	75	100	125	150	175	210	260	315	375	450
$\frac{5}{8}$	30	32	35	37	40	45	52	60	70	90	115	145	180	215	270	325	375	450	535
$\frac{11}{16}$	33	35	40	42	45	50	55	65	75	95	120	150	190	250	300	350	400	475	585
$\frac{13}{16}$	45	50	52	55	60	65	75	85	105	130	165	205	275	325	375	450	535	635	775
$\frac{15}{16}$	45	50	52	55	60	65	75	85	105	130	165	205	275	325	375	450	535	635	775
1	60	62	65	70	75	85	100	110	120	145	180	220	285	350	400	475	585	715	830
$1\frac{1}{8}$	70	72	75	82	90	100	110	120	135	160	195	235	310	375	475	525	635	775	925
$1\frac{1}{4}$	80	82	85	95	100	110	125	145	175	210	255	340	400	500	565	675	815	965	1155
$1\frac{3}{8}$	90	92	95	105	110	125	140	160	190	225	275	365	425	530	600	715	830	985	1185
$1\frac{1}{2}$	105	107	110	115	125	140	150	165	190	220	260	320	415	485	605	685	815	955	1155
$1\frac{3}{4}$	115	117	120	130	140	150	165	190	200	225	255	300	370	465	545	685	775	900	1080
$1\frac{5}{8}$	135	150	175	190	200	225	255	300	370	465	545	685	775	900	1080	1240	1420	1620	1820
2	160	180	220	235	245	270	300	350	430	500	590	700	850	1000	1150	1340	1540	1740	1940
$2\frac{1}{4}$	270	285	295	320	350	400	490	575	665	775	920	1110	1310	1510	1710	1910	2110	2310	2510
$2\frac{1}{2}$	350	365	375	400	430	480	575	665	775	920	1110	1310	1510	1710	1910	2110	2310	2510	2710
$2\frac{3}{4}$	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	900	925
3	600	625	650	675	700	725	750	775	800	825	850	875	900	925	950	975	1000	1025	1050
Diameter About.	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{4}$

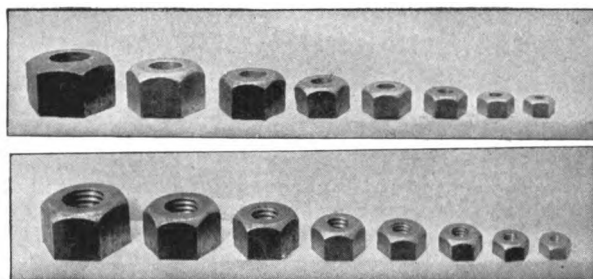
On Machine Screws made to order, differing in length, size, thread or head from our regular Standard Flat and Round Head Machine Screws, special prices will be given on application, and also on Fillister Head Machine Screws, when ordered in less quantity than ten gross of a kind.

We are prepared to furnish Special Screws of any description, made from either iron or brass upon short notice. Write for quotations on same.

D 331.

COLD-PUNCHED HEXAGON NUTS.

Chamfered and Trimmed. Blank, Tapped, Semi-Finished, Finished, and Finished Case-Hardened. United States and Standard Sizes.



Blank

Tapped.

Diam.	Thick- ness.	Hole.	For Bolt.	Per lb. Bl'nk	Per lb. Extra for Tapp'g	Number of Blank Nuts in 100 lbs.	Per 100 Semi- Finished	Per 100 Finished or Finished Case Hard'n'd	Threads to Inch.
1-2	1-4	13-64	1-4	27.0	9.0	8,200	\$ 2.00	\$ 6.00	20
19-32	5-16	1-4	5-16	24.0	7.0	5,100	2.50	7.00	18
11-16	3-8	19-64	3-8	18.5	6.0	3,000	3.25	8.00	16
25-32	7-16	11-32	7-16	18.0	4.5	2,030	3.75	9.00	14
7-8	1-2	25-64	1-2	14.0	3.5	1,400	4.00	10.00	13 or 12
31-32	9-16	29-64	9-16	14.0	2.8	1,060	5.00	12.00	12
1 1-16	5-8	33-64	5-8	12.5	2.3	780	5.50	15.00	11
1 1-4	3-4	5-8	3-4	10.9	2.0	470	7.50	18.00	10
1 7-16	7-8	47-64	7-8	10.9	1.8	308	10.00	22.00	9
1 5-8	1	27-32	1	10.9	1.8	312	13.50	30.00	8
1 13-16	1 1-8	15-16	1 1-8	10.9	1.8	150	17.00	35.00	7
2	1 1-4	1 1-16	1 1-4	11.5	2.2	111	24.00	45.00	7
2 3-16	1 3-8	1 5-32	1 3-8	12.0	2.2	85	34.00	55.00	6
2 3-8	1 1-2	1 9-32	1 1-2	12.6	2.2	69	44.00	65.00	6
2 9-16	1 5-8	1 3-8	1 5-8	13.2	2.7	54	54.00	80.00	5½
2 3-4	1 3-4	1 1-2	1 3-4	14.0	2.7	41	70.00	100.00	5
2 15-16	1 7-8	1 5-8	1 7-8	14.5	3.2	35	90.00	150.00	5
3 1-8	2	1 23-32	2	14.5	3.2	29	110.00	200.00	4½
3 5-16	2 1-8	1 13-16	2 1-8	15.0	4.0	25	130.00	275.00	4½
3 1-2	2 1-4	1 15-16	2 1-4	15.0	4.0	21	150.00	350.00	4½
3 7-8	2 1-2	2 3-16	2 1-2	16.0	4.5	15½	.....	.....	4
4 1-4	2 3-4	2 7-16	2 3-4	16.5	4.5	11	.....	.....	4
4 5-8	3	2 11-16	3	17.0	4.5	8½	.....	.....	3½
5	3 1-4	2 15-16	3 1-4	17.0	5.0	7	.....	.....	3½
5 3-8	3 1-2	3 3-32	3 1-2	17.0	5.0	5¾	.....	.....	3¾
6 1-8	4	3 9-16	4	18.0	5.0	4	.....	.....	3

We also keep in stock Thin Hexagon Nuts, which are three-quarters the standard thickness. Other dimensions regular. Price 4 cts. per lb. advance on above list. These Nuts are exact in size and so smooth as to require no further finish, except for the finest work.

They excel the ordinary hot-pressed Nut in strength as they do in appearance being strong enough to break a steel bolt.

The holes are punched and drilled correct size for standard taps.

Finished Nuts, not case-hardened, same list as finished case-hardened.

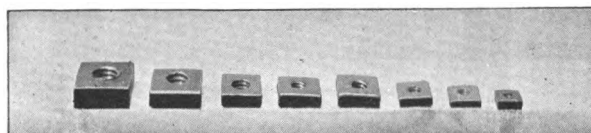
Our Finished Nuts are first-class in every particular, being milled to exact outside dimensions, tapped to uniform size, faced off on the bottom at right angles to the thread, and finely colored and hardened.

We can furnish Round and Fillister Head Cap Screws, Milled Iron Studs, Coupling Bolts, Planer Head Bolts, Iron and Copper Boiler Patch Bolts, Standard Steel Taper Pins, Machine Bolts, Carriage Bolts, Coach and Lag Screws and Stove Bolts at market rates.

D 332.

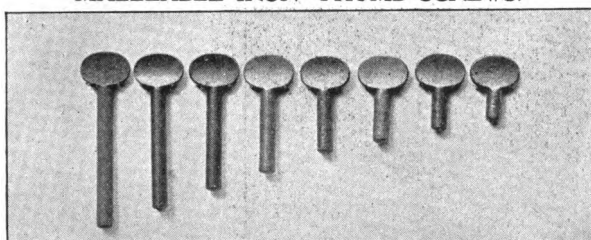
COLD PRESSED SQUARE NUTS.

Tapped to fit Machine Screws.

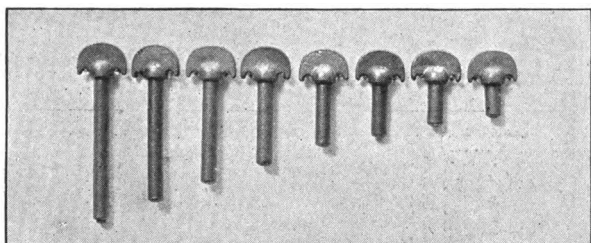
Gardner
Die Stocks
Adjustable.

Number.....	4	6	8	10	12	14	16	18	20	22	24
Threads.....	36	32	32	24	24	20	18	18	16	16	16
Per Gross, Iron.....	\$0.26	\$0.26	\$0.26	\$0.29	\$0.32	\$0.36	\$0.48	\$0.62	\$0.82	\$0.93	\$1.06
Per Gross, Brass.....	.72	.72	.80	.87	.94	1.08	1.44	1.88	2.45	.....	3.17

MALLEABLE IRON THUMB SCREWS.



D 333. Without Shoulder.



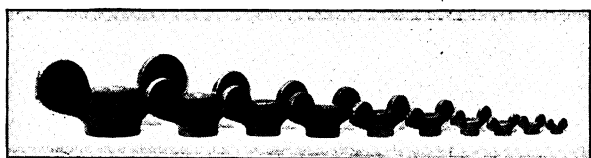
Gardner
Die Head
Cuts Exact
Threads.

D 334. With Shoulder.
PRICE PER HUNDRED.

Diameter.		1-8	3-16	1-4	5-16	3-8	7-16	1-2
Length under head ...	1-2	\$1.00	\$1.00	\$1.30	....	....	....	....
	3-4	....	1.00	1.40	\$1.85	\$3.20	....	....
	1	....	1.10	1.50	2.00	2.50	....	....
	1 1-4	....	....	1.65	2.20	2.70	....	....
	1 1-2	....	....	1.75	2.30	2.80	\$3.50	\$4.75
	2	....	....	2.00	2.60	3.10	4.00	5.00
	2 1-2	....	....	....	2.90	3.40	4.50	5.50
	3	....	....	....	3.20	3.70	5.00	6.00

D 335.

MALLEABLE IRON THUMB NUTS.



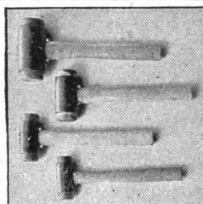
Diameter, inches.....	1-8	3-16	1-4	5-16	3-8	7-16	1-2	9-16	5-8	3-4
Per Pound, Blank.....	\$0.40	\$0.20	\$0.12	\$0.12	\$0.12	\$0.12	\$0.12	\$0.12	\$0.12	\$0.12

D 336.

PATENT HIDE-FACED HAMMERS.

Number.....	1	2	3	4	5
Weight, lbs.....	1	1 1/4	2	3 1/2	5 1/4
Each.....	\$0.90	\$1.15	\$1.40	\$2.00	\$2.80
Extra Faces, per pair...	.20	.25	.30	.42	.60

One pair of extra Faces included in above prices.



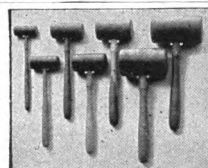
D 337.

PATENT RAW HIDE MALLETS.

For Wood
Mallets,
See Page 73.

Number.....	0	1	2	3	4	5	6
Diameter, inch.	1	1 1/4	1 1/2	1 3/4	2	2 3/4	2 3/4
Length, inch...	1 1/4	2 1/2	2 3/4	3	3 1/4	4	5
Weight, ounces	1 1/2	3	5	7	10	20	24
Each.....	\$0.25	\$0.30	\$0.35	\$0.45	\$0.55	\$1.25	\$1.50

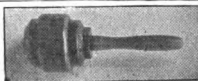
These Mallets are made entirely of raw hide.

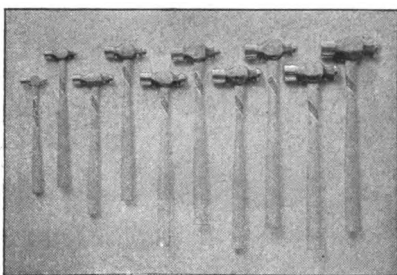


D 338.

RAW HIDE MAULS.

Number.....	1	2	3	4	5
Weight, lbs.....	3	4	6	8	10
Each.....	\$1.75	\$2.00	\$2.25	\$2.75	\$3.00





D 339.

MACHINISTS' HAMMERS.

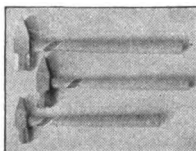
Ball, Straight or Cross Pein.

Weights do not include Handles.

No.	0000	000	00	0	1	2	3	4	5	6	7	8
Weight.	6 oz.	8 oz.	12 oz.	1 lb.	1 lb. 4 oz.	1 lb. 8 oz.	2 lb.	2 lb. 4 oz.	2 lb. 8 oz.	2 lb. 12 oz.	3 lb.	3 lb.
Per doz.	\$12.00	\$12.00	\$12.00	\$12.50	\$13.50	\$14.50	\$15.50	\$16.50	\$17.50	\$19.00	\$20.50	\$22.00
Each....	1.20	1.20	1.20	1.25	1.35	1.45	1.55	1.65	1.75	1.90	2.05	2.20

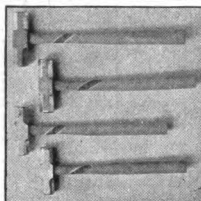
D 340.

SINGLE-FACE ENGINEERS' HAMMERS.



Weights do not include Handles.

Number.....	0	1	2	3
Weight.....	1 lb. 2 oz.	1 lb. 10 oz.	2 lb.	2 lb. 8 oz.
Per dozen.....	\$12.00	\$13.00	\$14.00	\$15.00
Each.....	1.20	1.30	1.40	1.50
Number.....	4	5	6	
Weight.....	3 lb.	3 lb. 8 oz.	4 lb. 8 oz.	
Per dozen.....	\$16.00	\$17.00	\$19.00	
Each.....	1.60	1.70	1.90	



D 341.

DOUBLE-FACE ENGINEERS' HAMMERS.

Weights do not include Handles.

Number...	1	2	3	4
Weight....	1 lb. 8 oz.	2 lb. 6 oz.	3 lb.	3 lb. 10 oz.
Per dozen.	\$14.50	\$16.50	\$18.00	\$19.50
Each.....	1.45	1.65	1.80	1.95

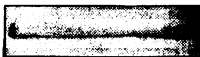
D 342.

RIVETING HAMMERS.

Plain Eye. Weights do not include Handles.



Number.....	0	1	2	3
Weight.....	4 oz.	7 oz.	9 oz.	12 oz.
Per dozen	\$5.50	\$5.75	\$6.00	\$6.25
Each.....	.55	.60	.60	.65
Number.....	4	5	6	7
Weight.....	15 oz.	1 lb. 2 oz.	1 lb. 6 oz.	1 lb. 10 oz.
Per dozen.....	\$6.50	\$7.00	\$7.50	\$8.00
Each.....	.65	.70	.75	.80



D 343.

HAMMER HANDLES.

Inches long.....	10	12	14	16	18	24	30	36
Per dozen	\$0.75	\$0.75	\$0.75	\$1.00	\$1.25	\$1.50	\$2.00	\$2.50
Each.....	.10	.10	.10	.12	.15	.18	.20	.25



D 344.

BILLINGS' HAMMERS.

Try our
Brush Copper.

Weights do not include Handles.

Number.....	Ball Pein				Straight Pein				Cross Pein			
	1	2	3	4	5	6	7	8	9	10	11	12
Weight.....	1/4	3/8	1 1/4	1 1/2	1/4	3/8	1 1/4	1 1/2	1 1/4	3/8	1 1/4	1 1/2
Each.....	\$1.00	\$1.40	\$1.70	\$2.00	\$1.00	\$1.40	\$1.70	\$2.00	\$1.00	\$1.40	\$1.70	\$2.00

D 345. ADZE-EYE BALL PEIN MACHINISTS' HAMMERS.

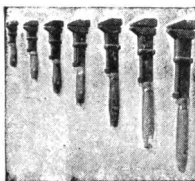


Number.....	1	2	3
Weights, without handles	4 oz.	8 oz.	12 oz.
Price, per dozen.....	\$12.00	\$12.00	\$13.00
Each.....	1.20	1.20	1.30
Number.....	4	5	6
Weight, without handles.	1 lb.	1 lb., 4 oz.	1 lb., 12 oz.
Price, per dozen.....	\$13.50	\$14.50	\$16.00
Each.....	1.35	1.45	1.60



D 346. COE'S GENUINE SCREW WRENCH, PATENT KNIFE HANDLE.

PRICE PER DOZEN.							
Size...	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	21 in.
Black..	\$ 9.00	\$10.00	\$12.00	\$14.00	\$24.00	\$30.00	\$36.00
Each..	.75	.85	1.00	1.20	2.00	2.50	3.00
Bright.	11.00	12.00	14.00	16.00	26.00	32.00	38.00
Each..	.90	1.00	1.20	1.40	2.20	2.70	3.20



D 347. AGRICULTURAL WRENCHES.

Size, inch.....	6	8	10	12	15
Black, per dozen.	\$ 9.00	\$10.00	\$12.00	\$14.00	\$24.00
Each.....	.90	1.00	1.20	1.40	2.40

D 348. BOARDMAN'S PATENT COMBINATION WRENCH.



Number	0	1	2	3
Size, inches	4½	6	8	10
Opening, inches....	1	1½	1¾	2½
Price, per dozen....	\$8.50	\$11.00	\$16.50	\$22.50
Each .....	.85	1.10	1.65	2.25

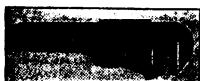
This combination comprises six useful tools, neatly and compactly arranged in a convenient form for practical use. *Screw and Pipe Wrench, Hammer, Screw Driver, Nail Claw, T Handle or Socket Wrench.*

D 349. BILLINGS & SPENCER POCKET WRENCHES.

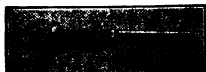


4 in., Black, each,	\$0.85	Nickel Plated, each,	\$0.95
5 in., " " "	1.00	" " "	1.20
6 in., " " "	1.20	" " "	1.50

D 350. BILLINGS & SPENCER MODEL F BICYCLE WRENCH.



This Wrench is furnished only with steel casting sliding jaw, and drop forged steel bar, with black finish, and is the best cheap wrench on market. Opens 1¼ inch, weight 5 ounces. Per dozen. \$5.00



D 351.

BARWICK WRENCH.

Number.....	0	1	2	3	4½
Grips { Inches.....	No. 7 wire	¼ pipe	½ to 1¼	1 to 2	2 to 3½
Each.....	\$1.50	\$2.00	\$3.00	\$4.00	\$6.00



D 352.

BEMIS & CALL CO.'S PATENT COMBINATION WRENCHES.

Description.....						
Bright Short Nut			Bright Long Nut			
Length, when open, in.	10	12	15	10	12	15
Grips { Inches.....	½ pipe	½ pipe	½ pipe	½ pipe	½ pipe	½ pipe
Each.....	1 pipe	1½ pipe	2 pipe	1 pipe	1½ pipe	2 pipe
Price, per dozen.....	\$ 23.00	\$26.00	\$ 37.00	\$ 25.25	\$28.50	\$ 40.50
Price, each.....	2.25	2.60	3.70	2.50	2.85	4.00



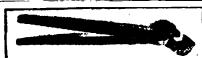
D 353.

STAR WRENCH.

Helmet Oil Lubricates Anything.

Handle.....		Iron		Wood or Iron		Iron	
Length when open, in.	6	8	10	14	18	24	36
Grips { Inches.....	½ pipe	½ pipe	½ pipe	½ pipe	½ pipe	½ pipe	½ pipe
Each.....	1 pipe	1 pipe	1 pipe	1 pipe	1 pipe	1 pipe	1 pipe
Price, per dozen.....	\$ 2.00	\$ 2.00	\$ 2.25	\$ 3.00	\$ 4.00	\$ 6.00	\$12.00
Price, each.....	2.00	2.00	2.25	3.00	4.00	6.00	12.00

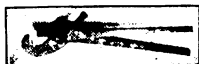




D 354.

COMMON PIPE TONGS.

Size, inches.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4
Each	\$0.60	\$0.65	\$0.70	\$0.75	\$0.90	\$1.10	\$1.30	\$1.50	\$1.90	\$2.50	\$4.25	\$5.25	\$6.25



D 355.

BROWN'S ADJUSTABLE PIPE TONGS.

Number.....	1	1 $\frac{1}{2}$	2	3	4	5	6	7
For Pipe, inches ..	$\frac{1}{8}$ to $\frac{3}{4}$	$\frac{3}{8}$ to 1	$\frac{1}{2}$ to 1 $\frac{1}{4}$	1 to 2	1 $\frac{1}{4}$ to 3	2 $\frac{1}{2}$ to 4	3 to 5	4 to 7
Each	\$1.30	\$1.65	\$2.00	\$3.00	\$6.00	\$11.00	\$25.00	\$35.00

BAXTER'S ADJUSTABLE "S" AND DIAGONAL WRENCHES.



Both Styles

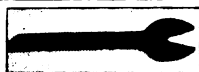
Same Price.



D 356.

D 357.

Sizes, inches	4	6	8	10	12
Each	\$0.50	\$0.75	\$1.00	\$1.50	\$2.00



D 358.

ALLIGATOR WRENCH.

Gardner
Grinder for
Flat Surface

Number.....	1	2	3	4	5
Holds Pipe, inches.....	$\frac{1}{8}$ to $\frac{3}{8}$	$\frac{3}{8}$ to $\frac{3}{4}$	$\frac{1}{2}$ to 1 $\frac{1}{4}$	1 $\frac{1}{4}$ to 2	2 to 3
Holds Round Iron, inches.....	$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{1}{2}$ to 1	$\frac{3}{4}$ to 1 $\frac{1}{2}$	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	2 $\frac{1}{4}$ to 3 $\frac{1}{2}$
Length, inches.....	5 $\frac{3}{4}$	10	16	22	27
Price, per dozen.....	\$4.00	\$12.00	\$24.00	\$36.00	\$54.00
Each.....	.35	1.00	2.00	3.00	4.50

D 359.

"ALWAYS READY" WRENCH.



Numbers.....	1	2	2 $\frac{1}{2}$	3
Takes Round Iron ..	$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{1}{2}$ to 1 $\frac{1}{4}$	$\frac{1}{4}$ to 1 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{3}{4}$
Per dozen	\$5.00	\$6.75	\$10.50	\$16.00
Each.....	.50	.70	1.05	1.60

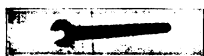
D 360.

DROP FORGED STEEL WRENCHES.



FOR SQUARE HEAD SET SCREWS,
SQUARE AND HEXAGON HEAD CAP SCREWS. ALL
WRENCHES, EITHER IN FORGED STATE OR
FINISHED, HAVE MILLED OPENINGS.

No. of Wrench.	Set Screws, Milled Opening for Head.	Square Head Cap Screws, Milled Opening for Head.	Hexagon Head Cap Screws, Milled Opening for Head.	Extreme Length.	Thick- ness of Head.	Price Each in Forged State.	Price Each in Finished State.
341	1-4 and 3-8	.....	.....	4	1-4	\$0.10	\$0.20
342	5-16 and 3-8	.....	.....	4	1-4	.10	.20
343	5-16 and 7-16	.....	.....	4	1-4	.12	.24
344	3-8 and 7-16	3-8 and 7-16	3-8 and 7-16	4	1-4	.12	.24
345	3-8 and 1-2	3-8 and 1-2	3-8 and 1-2	4	1-4	.12	.24
346	7-16 and 1-2	7-16 and 1-2	7-16 and 1-2	5	5-16	.15	.30
347	7-16 and 9-16	7-16 and 9-16	7-16 and 9-16	5	5-16	.15	.30
348	1-2 and 9-16	1-2 and 9-16	1-2 and 9-16	5	5-16	.17	.34
349	1-2 and 5-8	1-2 and 5-8	1-2 and 5-8	5	5-16	.17	.34
350	9-16 and 5-8	9-16 and 5-8	9-16 and 5-8	6	3-8	.20	.40
351	.....	.....	9-16 and 11-16	6	3-8	.20	.40
352	9-16 and 3-4	9-16 and 3-4	9-16 and 3-4	6	3-8	.20	.40
353	.....	.....	5-8 and 11-16	6	3-8	.20	.40
354	5-8 and 3-4	5-8 and 3-4	5-8 and 3-4	6	3-8	.22	.44
355	.....	5-8 and 13-16	.....	6	3-8	.22	.44
356	.....	.....	11-16 and 3-4	6	3-8	.22	.44
357	.....	.....	11-16 and 7-8	6	3-8	.22	.44
358	.....	3-4 and 13-16	.....	7	7-16	.25	.50
359	3-4 and 7-8	3-4 and 7-8	3-4 and 7-8	7	7-16	.25	.50
360	3-4 and 1	3-4 and 1	.....	7	7-16	.25	.50
361	.....	13-16 and 7-8	.....	7	7-16	.27	.54
362	.....	13-16 and 1	.....	7	7-16	.27	.54
363	7-8 and 1	7-8 and 1	.....	8	1-2	.30	.60
364	7-8 and 1 1-8	7-8 and 1 1-8	7-8 and 1 1-8	8	1-2	.30	.60
365	1 and 1 1-8	1 and 1 1-8	.....	8	1-2	.32	.64
366	1 and 1 1-4	1 and 1 1-4	.....	9	9-16	.35	.70
367	1 1-8 and 1 1-4	1 1-8 and 1 1-4	1 1-8 and 1 1-4	9	9-16	.35	.70



FIFTEEN DEGREE ANGLE SINGLE END WRENCHES.—For U. S. Standard Nuts.

D 361.**Drop Forged Steel.****ALL WRENCHES, EITHER FORGED OR FINISHED, HAVE MILLED OPENINGS.**

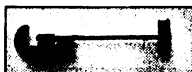
No. of Wrench.	Size Bolts, U. S. Standard Nut.	Milled Openings for U. S. Standard Nuts.	Extreme Length.	Thickness of Head.	Price each in Forged State.	Price each in Finished State.
262	1-8	5-16	4	5-32	\$0.08	\$ 0.16
263	3-16	13-32	3 7-8	5-32	.09	.18
264	1-4	1-2	5	1 4	.10	.20
265	5-16	19-32	5 5-8	1-4	.12	.24
266	3-8	11-16	6 1-2	5-16	.14	.28
267	7-16	25-32	7 1-2	5-16	.17	.34
268	1-2	7-8	8 3-8	7-16	.20	.40
269	9-16	31-32	9 1-4	7-16	.25	.50
270	5-8	1 1 16	10	9-16	.32	.64
271	3-4	1 1-4	11 3-4	9-16	.40	.80
272	7-8	1 7-16	13 1-8	3-4	.50	1.00
273	1	1 5-8	14 7-8	3-4	.65	1.30
274	1 1-8	1 13-16	16 3-4	15-16	.85	1.70
275	1 1-4	2	18 1-2	15-16	1.10	2.20
276	1 3-8	2 3-16	20 1-4	1 1-8	1.40	2.80
277	1 1-2	2 3-8	22 1-4	1 1-8	1.75	3.50
278	1 5-8	2 9-16	25	1 3-16	2.10	4.20
279	1 3-4	2 3-4	28	1 3-16	2.50	5.00
280	1 7-8	2 15-16	31	1 3-8	3.00	6.00
281	2	3 1-8	34	1 3-8	3.50	7.00
282	2 1-4	3 1-2	37	1 1-2	4.50	9.00
283	2 1-2	3 7-8	40	1 1-2	6.00	12.00
284	2 3-4	4 1-4	44	1 5-8	8.00	16.00



FIFTEEN DEGREES ANGLE DOUBLE END WRENCHES.—For U. S. Standard Nuts.

D 362.**Drop Forged of Steel.****ALL WRENCHES, EITHER FORGED OR FINISHED, HAVE MILLED OPENINGS.**

Wrench. No. of	Size Bolts, U. S. Standard Nuts.	Milled Openings for U. S. Standard Nuts.	Extreme Length.	Thickness of Head.	Price each in Forged State.	Price each in Finished State.
285	1-8 and 3-16	5-16 and 13-32	3	5-32 and 5-32	\$0.12	\$0.24
286	1-8 and 1-4	5-16 and 1-2	4	3-16 and 3-16	.14	.28
287	3-16 and 1-4	13-32 and 1-2	4	3-16 and 3-16	.15	.30
288	3-16 and 5-16	13-32 and 19-32	5	1-4 and 1-4	.17	.34
289	1-4 and 5-16	1-2 and 19-32	5	1-4 and 1-4	.18	.36
290	1-4 and 3-8	1-2 and 11-16	5 1-2	9-32 and 9-32	.20	.40
291	5-16 and 3-8	19-32 and 11-16	5 1-2	9-32 and 9-32	.21	.42
292	5-16 and 7-16	19-32 and 25-32	6 1-2	5-16 and 5-16	.23	.46
293	3-8 and 7-16	11-16 and 25-32	6 1-2	5-16 and 5-16	.25	.50
294	3-8 and 1-2	11-16 and 7-8	7	3-8 and 3-8	.30	.60
295	7-16 and 1-2	25-32 and 7-8	7	3-8 and 3-8	.30	.60
296	7-16 and 9-16	25-32 and 31-32	9	7-16 and 7-16	.33	.66
297	1-2 and 9-16	7-8 and 31-32	9	7-16 and 7-16	.35	.75
298	1-2 and 5-8	7-8 and 11-16	10 1-2	1-2 and 1-2	.40	.80
299	9-16 and 5-8	31-32 and 11-16	10 1-2	1-2 and 1-2	.43	.86
300	9-16 and 3-4	31-32 and 11-16	12	9-16 and 9-16	.45	.90
301	5-8 and 3-4	11-16 and 11-16	12	9-16 and 9-16	.50	1.00 For
302	5-8 and 7-8	11-16 and 17-16	13	9-16 and 3-4	.58	1.16 Many
303	3-4 and 7-8	11-16 and 17-16	13 3-4	9-16 and 3-4	.65	1.30 Tables
304	3-4 and 1	11-16 and 15-8	14 3-4	3-4 and 3-4	.75	1.50 See
305	7-8 and 1	17-16 and 15-8	15 3-4	3-4 and 3-4	.80	1.60 Back of
306	7-8 and 1 1-8	17-16 and 11-16	16 3-4	3-4 and 15-16	.90	1.80 Book.
307	1 and 1 1-8	15-8 and 11-16	17 1-2	3-4 and 15-16	1.00	2.00
308	1 and 1 1-4	15-8 and 2	18 1-2	3-4 and 15-16	1.12	2.24
309	1 1-8 and 1 1-4	11-16 and 2	19 1-2	15-16 and 15-16	1.25	2.50
310	1 1-8 and 1 3-8	11-16 and 2 3-16	20 1-2	15-16 and 11-8	1.40	2.80
311	1 1-4 and 1 3-8	2 and 2 3-16	21 1-4	15-16 and 11-8	1.60	3.20
312	1 1-4 and 1 1-2	2 and 2 3-8	22 1-4	15-16 and 11-8	1.80	3.60
313	1 3-8 and 1 1-2	2 3-16 and 2 3-8	23 1-4	11-8 and 11-8	2.00	4.00
314	1 3-8 and 1 5-8	2 3-16 and 2 9-16	24 1-4	11-8 and 13-16	2.25	4.50
315	1 1-2 and 1 5-8	2 3-8 and 2 9-16	25	11-8 and 13-16	2.50	5.00
316	1 1-2 and 1 3-4	2 3-8 and 2 3-4	26	11-8 and 13-16	2.75	5.50
317	1 5-8 and 1 3-4	2 9-16 and 2 3-4	27	13-16 and 13-16	3.00	6.00
318	1 5-8 and 1 7-8	2 9-16 and 2 15-16	28	13-16 and 13-8	3.25	6.50
319	1 3-4 and 1 7-8	2 3-4 and 2 15-16	29	13-16 and 13-8	3.50	7.00
320	1 3-4 and 2	2 3-4 and 3 1-8	30	13-16 and 13-8	4.00	8.00
321	1 7-8 and 2	2 15-16 and 3 1-8	31	13-8 and 13-8	4.50	9.00
322	1 7-8 and 2 1-4	2 15-16 and 3 1-2	32	13-8 and 11-2	5.00	10.00
323	2 and 2 1-4	3 1-8 and 3 1-2	33	13-8 and 11-2	5.75	11.50



BARNES' 3-WHEEL PIPE CUTTERS.



D 363. Pattern for No. 1 and 2 Cutters.

Number.....	1	2	3	4	5	6	7
Cuts Pipe, inches.....	$\frac{1}{2}$ to 1	$\frac{1}{2}$ to 2	$1\frac{1}{2}$ to 3	$2\frac{1}{2}$ to 4	4 to 6	6 to 8	9 to 12
Each.....	\$4.50	\$6.00	\$10.00	\$29.00	\$30.00	\$40.00	\$50.00
Extra Wheels, each.....	.25	.30	.40	.50	.75	.75	.75
Extra Wheel Pins, per doz.	1.00	1.00	1.00	2.00	2.00	2.00	2.00

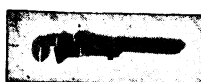
D 364. Pattern for Nos. 8, 4, 5, 6 and 7 Cutters.



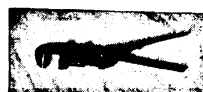
D 365.

SAUNDERS' PIPE CUTTERS.

Number.....	1	2	3
Cuts Pipe, inches.....	$\frac{1}{2}$ to 1	1 to 2	2 to 3
Each.....	\$3.00	\$4.50	\$14.00
Extra Blocks and Wheels, each.....	1.25	1.75	3.25
Extra Wheels.....	.24	.32	.60
Extra Holders.....	.24	.32	.50



WRIGHT WRENCHES.



D 366.

Wright 1896 Wrench.

Length when open, in.	6	8	10
Jaws open, inches.....	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Each.....	\$2.00	\$2.00	\$2.25

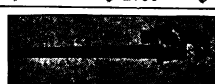
D 367.

Wright 1895 Wrench.

Length when open, in.	13	18	24
Jaws open, inches.....	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$
Each.....	\$3.00	\$4.00	\$6.00



STILLSON WRENCHES.



D 368. 6 to 18 Inches.

D 369. 24 to 48 Inches.

Length when open, in..	6	8	10	14	18	24	36	48
Grips { Inches.....	$\frac{1}{2}$ wire to $\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to $\frac{3}{4}$ pipe	$\frac{1}{2}$ wire to 1 pipe	$\frac{1}{2}$ wire to $1\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to 2 pipe	$\frac{1}{2}$ wire to $2\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to $3\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to 5 pipe
Each.....	\$2.00	\$2.00	\$2.25	\$3.00	\$4.00	\$6.00	\$12.00	\$18.00

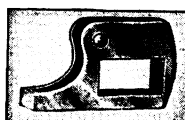
REPAIRS FOR STILLSON WRENCHES.



D 370. Stillson Nut.



D 371. Stillson Handle.

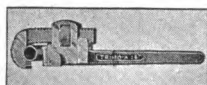


D 372. Stillson Frame.



D 373. Stillson Jaw.

Size, inches....	6	8	10	14	18	24	36	48
Nuts, each.....	\$0.20	\$0.20	\$0.27	\$0.35	\$0.42	\$0.50	\$0.65	\$0.80
Handles, each...	.15	.15	.20	.25	.30	...	...	...
Frames, each...	.25	.25	.33	.45	.55	.65	.75	1.00
Jaws, each.....	.67	.67	.75	1.00	1.33	2.00	4.00	6.00



TRIMO PIPE WRENCHES.



D 374.

Trimo Pipe Wrench.

Length when open, in..	6	8	10	14	18	24	36	48
Grips { Inches.....	$\frac{1}{2}$ wire to $\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to $\frac{3}{4}$ pipe	$\frac{1}{2}$ wire to 1 pipe	$\frac{1}{2}$ wire to $1\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to 2 pipe	$\frac{1}{2}$ wire to $2\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to $3\frac{1}{2}$ pipe	$\frac{1}{2}$ wire to 5 pipe
Each.....	\$2.00	\$2.00	\$2.25	\$3.00	\$4.00	\$6.00	\$12.00	\$18.00

D 375.

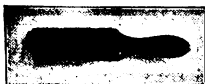
Repairs for Trimo Wrench.

Size, inches....	6	8	10	14	18	24	36	48
Jaws, each.....	\$0.67	\$0.67	\$0.75	\$1.00	\$1.33	\$2.00	\$4.00	\$6.00
Nuts, each.....	.20	.20	.27	.35	.42	.50	.65	.80
Inserted Jaws...	.25	.25	.33	.50	.55	.65	1.00	1.25
Frames, each...	.25	.25	.33	.45	.55	.65	.75	1.00

D 376. REPAIRS FOR TRIMO WRENCHES.

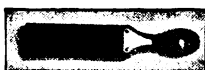
Size, inches....	6	8	10	14	18	24	36	48
Jaws, each.....	\$0.67	\$0.67	\$0.75	\$1.00	\$1.33	\$2.00	\$4.00	\$6.00
Nuts, each.....	.20	.20	.27	.35	.42	.50	.65	.80
Inserted Jaws...	.25	.25	.33	.50	.55	.65	1.00	1.25
Frames, each...	.25	.25	.33	.45	.55	.65	.75	1.00

FILE BRUSHES.



D 377.
Common.

Doz., \$1.25. Each, 15c.



D 378.
Nicholson's Plain.

Doz., \$1.50. Each, 15c.



D 379.
Nicholson's File Card
and Brush.

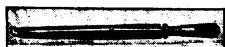
Doz. \$4.50. Each, 45c.

**D 380. THE BOSS FILE CLEANER.**

The handle of this Cleaner is raised up, thus avoiding striking file with fingers when *in use*.

Price, per dozen\$2.75

VICE FILE HOLDER.

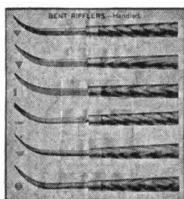
**D 381.**

Number	1	2	3	4	5
D 381. Price, each	\$1.25	\$1.50	\$1.75	.....	.....
D 382. Price, each				\$1.00	\$1.25
To hold files, inches long	5 & 6	8 & 10	12 & 14	12, 13, 14	14, 15, 16

SURFACE FILE HOLDER.

**D 382.**

Number	1	2	3	4	5
D 381. Price, each	\$1.25	\$1.50	\$1.75	.....	.....
D 382. Price, each				\$1.00	\$1.25
To hold files, inches long	5 & 6	8 & 10	12 & 14	12, 13, 14	14, 15, 16

**D 383.**

BENT
RIFFLERS.

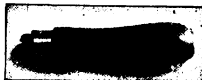
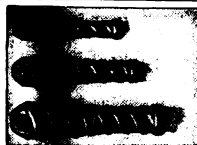
STUB FILES AND HOLDER.

**D 384.**

Brass in
Rods,
Sheets,
Tubes.

D 383. Per set of 6, handled	\$2.50
D 384. Per set of 6, stub and holder	5.00
Extra Stub Files, each .....	.30

FILE HANDLES.

**D 385. Hardwood.****D 386. Adjustable.****D 387. Iron.**

D 385.	Per doz	Soft wood, \$0.25.		Hard wood, \$0.35	
D 386.	Size No. 8 only, per doz	1.50			
D 387.	Iron, Number	1	2	3	4
	Iron, Copperized, per doz	\$0.50	\$0.70	\$0.85	\$1.20
	Iron, Nickel Plated, per doz	0.90	1.00	1.25	1.50

**D 388.**

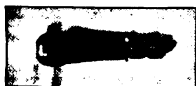
WOOD MALLET.

For
Raw Hide
Mallets,
See Page 67.

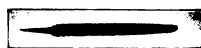
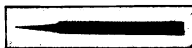
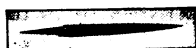
Diameter, inches	1 1/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2
Length, inches .....	..	..	5	6	6	6	6 1/2	6 1/2
Applewood, each				\$0.50	\$0.60	\$0.70	.....	.....
Hickory, each	\$0.25	\$0.25	\$0.30	.35	.40	.40	\$0.45	\$0.50

D 389.

MILLER'S FALLS TOOL HOLDERS.



No. 1, with 20 Tools, each	\$1.00
No. 2, Solid Maple Handle (no Tools) each ..	.40
No. 4, with 11 Tools, each	1.25
No. 5, with 11 Tools, each	1.50



D 390.

NEW PRICE LIST AMERICAN FILES.

MILL AND ROUND.				FLAT AND SQUARE.			
Inch.	Bastard.	2d Cut.	Smooth.	Inch.	Bastard.	2d Cut.	Smooth.
4	\$ 1.80	\$ 2.15	\$ 2.40	4	\$ 2.00	\$ 2.40	\$ 2.65
5	2.00	2.40	2.65	5	2.20	2.60	2.90
6	2.25	2.65	2.95	6	2.50	2.95	3.25
7	2.55	3.00	3.30	7	2.90	3.40	3.75
8	2.90	3.40	3.70	8	3.40	4.00	4.35
9	3.30	3.85	4.20	9	4.00	4.70	5.10
10	3.80	4.40	4.80	10	4.70	5.45	5.90
11	4.50	5.20	5.65	11	5.60	6.50	7.05
12	5.40	6.20	6.75	12	6.70	7.70	8.40
13	6.50	7.45	8.05	13	8.00	9.15	10.00
14	7.80	8.90	9.65	14	9.50	10.90	11.80
15	9.30	10.60	11.45	15	11.20	12.75	13.75
16	11.00	12.50	13.40	16	13.10	14.85	16.00
17	12.90	14.60	15.60	17	15.25	17.25	18.45
18	15.10	16.90	18.10	18	17.65	19.75	21.20
19	17.60	19.70	21.10	19	20.30	22.75	24.35
20	20.40	22.85	24.50	20	23.20	26.00	27.85

EXTRAS.—Mill Double Cut, Mill Narrow Points, Cross Cut Blunt, advance 1 inch. Cant Blunt (Double Cut), advance 2 inches.

HAND, WARDING AND PILLAR.				HALF ROUND AND THREE SQUARE.			
Inch.	Bastard.	2d Cut.	Smooth.	Inch.	Bastard.	2d Cut.	Smooth.
4	\$ 2.25	\$ 2.70	\$ 3.00	4	\$ 2.50	\$ 3.00	\$ 3.30
5	2.50	3.00	3.30	5	2.80	3.35	3.70
6	2.80	3.30	3.65	6	3.20	3.80	4.15
7	3.20	3.75	4.15	7	3.70	4.35	4.80
8	3.70	4.35	4.75	8	4.30	5.00	5.50
9	4.35	5.10	5.55	9	5.00	5.85	6.40
10	5.20	6.00	6.55	10	5.80	6.75	7.30
11	6.30	7.30	7.95	11	6.70	7.75	8.45
12	7.50	8.60	9.40	12	7.80	9.00	9.75
13	8.90	10.20	11.00	13	9.10	10.40	11.25
14	10.50	12.00	13.00	14	10.60	12.10	13.10
15	12.30	14.00	15.10	15	12.40	14.15	15.25
16	14.30	16.20	17.50	16	14.50	16.50	17.70
17	16.60	18.75	20.10	17	16.90	19.10	20.50
18	19.20	21.50	23.00	18	19.60	22.00	23.50
19	22.10	24.75	26.50	19	22.60	25.30	27.10
20	25.30	28.35	30.35	20	26.00	29.10	31.20

EXTRAS.—Ginsaw (single), take Bastard price. Slotting (Blunt), advance 2 inches. Knife, advance 1 inch. High Back Hf. Rd. (Blunt), Cross, Feather Edge, advance 2 inches.

INCH		3	3½	4	4½	5	5½	6	7	8	9	10	11	12	13	14
Tapers,	Single Cut,	1.10	1.10	1.20	1.40	1.70	2.00	2.40	3.00	3.80	4.60	5.70	7.20	9.00	11.00	13.20
Tapers,	Double Cut,	1.60	1.60	1.75	2.00	2.40	2.75	3.25	4.00	4.95	5.90	7.10	8.80	10.80	12.90	15.20
Slim Tapers,	Single Cut,	1.20	1.20	1.30	1.45	1.70	1.90	2.10	2.50	3.00	3.70	4.50	5.50	6.80	8.30	10.00
Slim Tapers,	Double Cut,	1.80	1.80	1.90	2.10	2.40	2.60	2.85	3.30	3.90	4.70	5.60	6.75	8.20	9.75	11.50
Pitsaw Blunt,	Single Cut,	2.10	2.10	2.20	2.30	2.50	2.80	3.20	3.70	4.30	5.00	5.80	6.70	7.70	...	...
Hooktooth Blunt,	Single Cut,	...	...	...	...	...	...	.3	.60	.90	1.40	1.50	1.60	1.70	1.80	1.90
Gardner Grinder Grinding Flat Surfaces																
EXTRAS	{	Bandsaw, Heavy, Blunt, take Taper Double Cut Price.														
		" " Light,	" " " Slim Taper "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
		Cantsaw,	" " " Single Cut,	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
		Round Gulleting,	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
		Round Off,	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
		Reversible Tapers,	double the price of Slim Tapers of half their length.													

EXTRAS. (GENERAL.)—One Round Edge, advance 7½ per cent., and Two Round Edges, 15 per cent. on respective Kinds and Cuts.

Blunt Files, not specified, advance one inch on respective Kinds and Cuts. **Dead Smooth**, double the price of Bastard Cut.

Equalings, (Bellied), advance 2 inches on respective Kinds and Cuts.

Sizes Below 4 Inches, not extended, take 4-inch price; 1-2 inches, not specified, take next higher full inch price.

Rough, Coarse, Union Cut, Brass, or other than Regular Cuts, (not specified,) made upon Regular or Standard Shaped Blanks advance one inch on respective Kinds and Cuts.

Single or Float Cut, (not specified,) on Regular Shapes, take Double Cut Price.

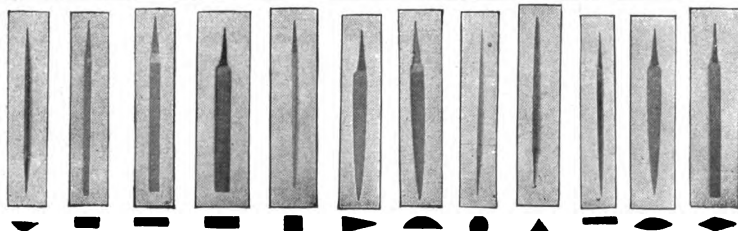
Irregular Goods.—All lengths above those listed, and Files varying from Standard Sizes, to be classed as Irregular are subject to special prices.

D 391.

STUBS' FILES.

	Inch.		Bastard.	Smooth.	Super.		Inch.		Bastard.	Smooth.	Super.
30. Half Round.	1 to 3	Doz.	\$1.95	\$2.15	\$2.70	27. Hand or Pottance	1 to 3½	Doz.	\$1.85	\$2.05	\$2.70
		Each	.20	.22	.27			Each	.18	.21	.28
Round Edge	3½	Doz.	2.15	2.40	2.90		4	Doz.	1.95	2.30	3.10
Joint or Drill.	4	Each	.22	.24	.29			Each	.20	.23	.31
		Doz.	2.50	2.70	3.25		4½	Doz.	2.90	3.35	4.10
		Each	.25	.37	.33			Each	.29	.34	.41
Flat back	4½	Doz.	3.35	3.65	4.30	29. Knife.	5	Doz.	2.95	3.55	4.30
Half Round		Each	.34	.37	.43			Each	.30	.36	.43
or Half Oval.	5	Doz.	3.55	3.90	4.70		6	Doz.	3.75	4.30	5.05
		Each	.36	.39	.47			Each	.38	.43	.51
	6	Doz.	4.30	4.70	5.45		8	Doz.	5.05	5.80	6.95
		Each	.43	.47	.55			Each	.51	.58	.70
32. Taper Three Square.	1 to 3	Doz.	1.65	1.95	2.15	31. Round.	1 to 3	Doz.	1.75	2.15	2.70
		Each	.17	.20	.22			Each	.18	.22	.27
	3½	Doz.	1.75	2.15	2.40		3½	Doz.	1.85	2.30	2.90
		Each	.18	.22	.24			Each	.19	.23	.29
	4	Doz.	1.95	2.30	2.70		4	Doz.	1.95	2.50	3.25
		Each	.20	.23	.27			Each	.20	.25	.33
26. Equal'g.	4½	Doz.	2.80	3.15	3.75	34. Crossing.	4½	Doz.	2.80	3.35	4.30
		Each	.28	.32	.38			Each	.28	.34	.43
	5	Doz.	2.95	3.55	4.10		5	Doz.	2.95	3.55	4.70
		Each	.30	.36	.41			Each	.30	.36	.47
	6	Doz.	3.35	3.90	4.85		6	Doz.	3.35	4.30	5.80
		Each	.34	.39	.49			Each	.34	.43	.58
28. Square.	1 to 3½	Doz.	1.95	2.15	2.70	33. Warding	1 to 3	Doz.	2.30	2.50	2.90
		Each	.20	.22	.27			Each	.23	.25	.29
	4	Doz.	2.15	2.30	3.10		3½	Doz.	2.50	2.70	3.25
		Each	.22	.23	.31			Each	.25	.27	.33
	4½	Doz.	2.95	3.35	4.10		4	Doz.	2.70	2.90	3.65
		Each	.30	.34	.41			Each	.27	.29	.37
26. Pillar.	5	Doz.	3.15	3.55	4.30	33. Warding	4½	Doz.	3.55	3.90	4.70
		Each	.32	.36	.43			Each	.36	.39	.47
	6	Doz.	3.55	4.30	5.05		5	Doz.	3.75	4.30	5.05
		Each	.36	.43	.51			Each	.38	.43	.51
	1 to 3	Doz.	1.85	2.05	2.70		6	Doz.	4.70	5.05	5.80
		Each	.19	.21	.27			Each	.47	.51	.58
Taper Flat.	3½	Doz.	1.85	2.05	2.70	33. Warding	1 to 3½	Doz.	1.75	1.95	2.70
		Each	.19	.22	.27			Each	.18	.20	.27
	4	Doz.	1.95	2.30	3.10		4	Doz.	1.95	2.25	2.90
		Each	.20	.23	.31			Each	.20	.23	.29
	4½	Doz.	2.90	3.35	4.10		4½	Doz.	2.70	3.15	3.90
		Each	.29	.34	.41			Each	.27	.32	.39
26. Pillar.	5	Doz.	2.95	3.55	4.30	33. Warding	5	Doz.	2.80	3.35	4.30
		Each	.30	.36	.43			Each	.28	.34	.43
	6	Doz.	3.75	4.30	5.05		6	Doz.	3.55	4.10	5.05
		Each	.38	.43	.51			Each	.36	.41	.51

	Inch.	Dozen.	Each.		Inch.	Dozen.	Each.
35. Slitting Files, Bastard.	2	\$1.95	\$0.20	Saw Files, Taper or Blunt, Single or Double Cut	1 to 3	\$1.70	\$0.17
	2½	2.30	.23		3½	1.80	.18
	3	2.50	.25		4	2.00	.20
	3½	2.70	.27		4½	2.80	.28
	4	2.90	.29		5	3.10	.31
	4½	3.75	.38		5½	3.30	.33
	5	3.90	.39		6	3.50	.35
	6	4.70	.47		6½	3.90	.39
					7	4.25	.43
					8	5.25	.53

Bonan
Cups f
Helme
Oil.

Barrette.

Narrow
Pillar.Regular
Pillar.
Equaling
same shape.

Hand.

Square.

Knife.

Half Round.

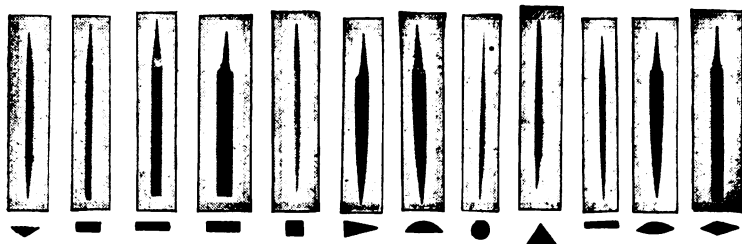
Round.

Three
Square.

Warding.

Cross.

Slitting.



Barrette. Narrow Pillar. Regular Pillar. Equaling same shape. Hand. Square. Knife. Half Round. Round. Three Square. Warding. Cross. Slitting.

The black dots show cross section of the files they are under.

Parallel Clamps a Parallel.

D 392.

SWISS FILES.

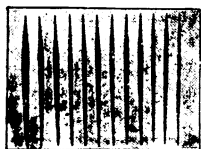
DESCRIPTION.	2 in.	2 1-2	3 in.	3 1-2	3 3-4	4 in.	4 1-2	5 in.	6 in.	7 in.	8 in.	10 in.
Hand, No. 00 and 0	1.70	1.80	1.85	2.15	2.65	2.90	3.15	3.65	3.95	4.90	8.10	
" " 1	1.70	1.80	1.85	2.15	2.65	2.90	3.20	3.65	4.00	4.95	8.15	
" " 2	1.70	1.80	1.85	2.15	2.65	2.90	3.20	3.65	4.10	5.00	8.25	
" " 3	1.70	1.80	1.95	2.15	2.65	2.90	3.20	3.70	4.10	5.00	8.40	
" " 4	2.05	1.90	1.95	2.20	2.75	2.95	3.35	3.90	4.30	5.25	8.75	
" " 5	2.25	1.95	2.25	2.40	2.90	3.10	3.40	4.15	4.70	6.00	8.95	
" " 6	2.50	2.25	2.50	2.75	3.10	3.30	3.65	4.60	5.10	6.50	9.50	
" " 8	2.70	2.50	2.75	2.80	3.40	3.60	3.80	5.05	6.00	7.00		
Pillar, 2 Safe Edges, No. 00 and 0	1.70	1.70	1.70	1.80	2.00	2.60	2.72	3.05	3.25	3.50	4.70	7.60
" " 1	1.70	1.70	1.70	1.80	2.00	2.60	2.72	3.05	3.25	3.50	4.70	7.95
" " 2	1.70	1.70	1.70	1.80	2.00	2.60	2.72	3.10	3.25	3.50	4.70	8.25
" " 3	1.70	1.70	1.70	1.90	2.00	2.60	2.72	3.10	3.30	3.75	4.70	8.60
" " 4	1.70	1.70	1.70	1.90	2.00	2.60	2.72	3.10	3.30	3.75	4.70	8.90
" " 5	1.70	1.70	1.70	1.90	2.10	2.70	2.80	3.20	3.45	3.80	4.80	9.25
" " 6	1.70	1.75	1.75	1.95	2.10	2.70	2.80	3.20	3.45	3.80	4.80	9.60
" " 8	1.70	1.75	1.75	2.10	2.45	2.90	3.35	3.40	3.70	4.10	4.95	
Half Round	1.70	1.70	1.70	1.80	2.25	2.72	2.90	3.25	3.95	4.60	5.35	8.75
Barrette	1.70	1.70	1.70	1.80	2.15	2.60	2.90	3.20	3.60	4.60	5.35	8.75
Square	1.30	1.30	1.30	1.30	1.55	2.05	2.30	2.40	2.75		4.55	6.25
Round	1.15	1.15	1.15	1.15	1.50	2.00	2.10	2.30	2.70	3.50	4.25	6.40
Crossing	1.70	1.70	1.70	1.80	2.25	2.72	2.90	3.25	3.95	4.60	5.35	8.75
Equaling	1.70	1.70	1.70	1.80	2.25	2.65	2.90	3.25	3.95	4.60	5.35	8.75
Taper Flat and Warding	1.70	1.70	1.70	1.80	2.25	2.72	2.90	3.25	3.95	4.60	5.40	8.75
Knife, Single Cut	1.70	1.70	1.70	1.80	2.25	2.72	2.90	3.25	3.95	4.60	5.40	8.75
" Double Cut	1.85	1.85	1.95	2.10	2.65	3.00	3.30	3.60	4.25	5.85		
Three Square	1.85	1.85	1.85	1.95	2.15	2.90	2.95	3.10	3.45	4.15		
Cant or Barrette, three sides cut			1.95	2.10		3.30		4.00	4.65			
Round Edge Joints				1.50		2.20	2.50	2.60	3.25			
Parallel Round	.95	.95	1.20	1.20		2.20	2.50	2.70				
Slitting, with tang	1.60	1.70	1.70	1.80		2.60						
Slitting, without tang	1.60	1.70	1.70	1.80		2.75						
Crochet			1.60	1.75		2.40		3.15	3.60			
Pivot, Right or Left	2.40											

Escapement, Round.....\$1.15 Square.....\$1.30 All other Shapes.....\$1.60

Needle Files, per gross, 12 c/m. \$13.65; 14 c/m. \$14.75; 16 c/m. \$16.00

Pillar, one safe edge, 15 cents per dozen more than regular pillar.

Rifflers,.....per doz., small, \$2.40; medium \$2.75; large, \$2.90; extra large, \$3.25



D 393.

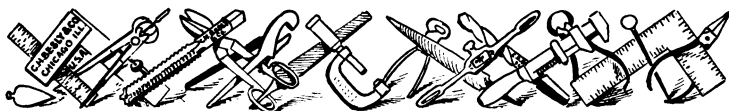
D 393. DIE SINKERS' FILES.

12 Files in a set—Price, per set.....\$1.40

Straight Round Joint, by Twist Drill Gauge,
Nos. 15-29, \$1.30; 30-54, \$1.10 per doz.

D 394. NEEDLE FILES.—With Wire Handles.

Price, per dozen, 4 inch, 90c.; 4 3/4 inch, \$1.00;
5 1/4 inch, \$1.10; 6 1/4 inch, \$1.20.





SCREW DRIVERS.



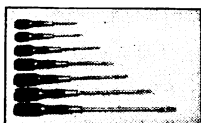
D 395. Cast Steel Blade, Natural Wood Handle.

Length, inches	2	3	4	5	6	8	10	12
D 395, per dozen	\$1.50	\$1.75	\$2.00	\$2.50	\$3.00	\$4.00	\$5.00	\$5.50
D 395, each	.10	.15	.17	.20	.25	.30	.40	.50
D 396, per dozen	2.00	2.50	3.00	3.50	4.00	5.50	6.50	9.00
D 396, each	.20	.25	.30	.35	.40	.55	.65	.90

D 396. Round Steel Blade, Ebonized Handle.

D 397.

CHAMPION SCREW DRIVERS.



SINGLE GRIP.		2 1/2	3	4	5	6
Length, inches		2 1/2	3	4	5	6
Price, per dozen		\$3.25	\$3.50	\$4.25	\$5.00	\$6.00
Price, each		.32	.35	.42	.50	.60
Length, inches		7	8	9	10	12
Price, per dozen		\$7.00	\$8.00	\$9.00	\$10.00	\$12.00
Price, each		.70	.80	.90	1.00	1.20

DOUBLE GRIP.

Length, inches	12	15	18	24	30
Price, per dozen	\$14.00	\$16.00	\$18.00	\$24.00	\$30.00
Price, each	1.40	1.60	1.80	2.40	3.00

D 398.

CABINET SCREW DRIVERS.

Same as the Champion, only with lighter handles and slender blades.

Inches	2 1/2	3 1/2	4 1/2	5 1/2	6 1/2	8 1/2	10 1/2	12 1/2
Per dozen	\$3.00	\$3.50	\$4.50	\$5.50	\$6.50	\$8.00	\$9.50	\$11.00
Each	.30	.35	.45	.55	.65	.80	.95	1.00

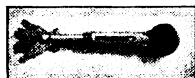


D 399.

BILLINGS & SPENCER'S GUN AND MACHINE-MAKERS' SCREW DRIVERS.

Drop-forged from best tool steel, spring tempered with fancy wood handles.

Number	1	2	3	4	5
Diameter and Length of Blade, inches	1-8x3	1-4x3	5-16x3	3-8x3	1-2x6
Price, per dozen	\$4.00	\$4.00	\$4.50	\$4.50	\$6.00
Price, each	.40	.40	.45	.45	.60

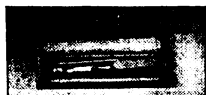


D 400.

BILLINGS & SPENCER'S MAGAZINE SCREW DRIVERS.

This is a neat tool for sportsmen or anyone who wants a compact tool of the kind. Four sizes of screw drivers contained within the handle. The blades are pivoted to the slide and cannot be lost except the whole tool is lost. By raising the locking bolt and pressing forward the slide to end of slot, the screw driver blades will swing out: Select the size driver wanted and draw the slide back into the handle and the driver is ready for use. The total length when closed is 3 3/4 inches.

Price, each	\$1.25
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SCREW DRIVER SETS.



We Cut
Sheet
Brass
Special
Sizes to
Order.

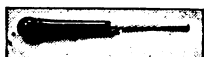
D 401.

Thayer's Screw Driver Sets.

D 401. Each set contains an Ebonized Handle made octagon shape, with one each of 3, 4, 5 and 6-inch Screw Drivers. Price per set in maple case	\$1.25
D 402. With 3 Bits, in paper box, per set	1.00
D 402. With 4 Bits, in maple box, per set	1.25

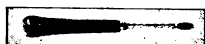
D 402.

Clark's Screw Driver Sets.



D 403. No. 11.

AUTOMATIC SCREW DRIVERS.



D 404. No. 12.

No. 11, without Drill Points but with 3 Screw Driver Bits.....	Per Doz. \$15.00	Each. \$1.25
No. 12, with 8 Drill Points and 3 Screw Driver Bits.....	21.00	1.75

This tool is much like others of the same class, but is more highly finished and better made than any heretofore put on the market. It has one addition, which is nearly indispensable for satisfactory work, that is a patent revolving sleeve which the left hand grasps when the tool is working. While this sleeve is a great advantage in driving screws, it also enables the tool to be used as an automatic drill. The only additional expense is for the drill points. There is also a locking device which prevents the screw driver from falling out of engagement when held perpendicular. All the metal parts are highly polished and heavily nickel-plated. The handle is of Cocobola. Full length extended, 17 inches. The three screw driver bits which go with each tool are 4 inches long, and made to fit screws of varying sizes.



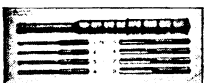
D 405.

EUREKA SPIRAL SCREW DRIVERS.

The No. 1 when opened is 14 in. long, and when closed is 9 in., each.....\$2.00
The No. 2 when opened is 19 in. long, and when closed is 12 in., each..... 2.50

This screw driver has become a standard tool, works equally well in hard or soft wood, and will drive a screw in one-third of the time required by the old way.

The tool is well made and durable. The cylinder is of best seamless brass tubing; the blades of finest tool steel, both being highly finished, making a handsome appearance it addition to its utility as well as durability, and is a tool which no mechanic can well afford to be without. It is almost indispensable, as thousands are ready and willing to testify.



D 406.

JOHNSON'S

AUTOMATIC BORING TOOLS.

Try our
Brush
Copper for
Electrical
Work.

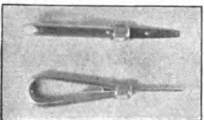
This instrument is designed for boring wood for various purposes, such as for setting brads, finishing nails, screws, etc., eight bits accompany each tool. It can be used in many places where the bit, brace gimlet, or brad awl cannot, and is superior to either for the purposes mentioned.

No. 0. All Metal, with 8 Points, each.....	\$2.00
No. 1. Solid Rosewood Handle, with 8 Points, each.....	2.00
No. 2. Rosewood Handle, with cells for 8 Points, each.....	2.50
Extra Points, per set of 8.....	.75

D 407. SCREW DRIVERS.—Hollow Steel Handles, Welded to Blade.



Length of Blade, inches.	2½	3½	4	5
Price, per dozen.....	\$3.50	\$4.00	\$4.50	\$8.25
Price, each.....	.30	.35	.40	.70



D 408.

STARRETT'S POCKET COMPANION TOOL.

Screw Driver, Brad Awl, Wrench.

D 408. No. 150. A compact combination of three tools a man is apt to wish he had with him a dozen times a day. Consists of a neat, finely finished steel handle with a knurled nut which firmly holds a screw driver and brad awl made in one piece, this being telescoped within the handle when not in use. The shape of the handle enables it to be used as an emergency wrench—often of the greatest convenience. The tool weighs only two ounces. It is of especial value to wheelmen, as it takes the place of a number of tools usually carried with a bicycle.

Plain, each.....	\$0.35
Plain, in lots of 1 dozen or over, per dozen.....	4.00
Nickeled, each.....	.45
Nickeled, in lots of 1 dozen or over, per dozen.....	5.00

D 409. No. 151. The same as No. 150, except screw driver at both ends of the blade, one larger than the other. Prices same as No. 150.



D 410.

STUBS' STEEL, HAND-FORGED SCREW DRIVER BITS.

Assorted sizes, 1 dozen, boxed, price per dozen..... \$2.00

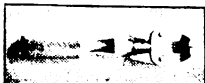


D 411.

CHICOPEE HAND DRILL.

For Useful
Tables, see
Back of
Book.

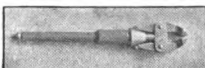
No. 1. 3-16 inch Chuck, each.....	\$2.00
No. 2. 1-8 inch Chuck, each.....	1.75
No. 3. 3-16 inch Chuck, each.....	2.00



D 412. IMPROVED HAND VISE.

Price, per doz....\$18.00 | Price, each.....\$1.80

It is of metal throughout, the jaws being of forged steel. Warranted in every particular. For holding wire, there is a hole through the handle and screw. Weight, 8 ounces.



D 413. JEWELERS' PIN VISE.

Price, per dozen\$18.00
Price, each..... 1.80



D 414.

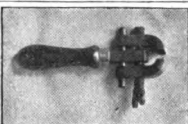
ALFORD HAND VISE, No. 1.—6 1-2 In.

With Tools.

Price, each, with all tools \$1.75

Of forged and tempered steel. Handle hollow, and the bit shank and tools are placed inside. The blades bent at right angles are for cutting washers.

The vise jaws are 1¼ inches wide and open 1¼ inches. They will center and hold firmly tools of any shape. The handle can be unscrewed from the vise and the bit shank put in its place to be used with a bit brace. The handle can also be screwed into the vise at right angles with its usual position, which is desirable for many kinds of work.

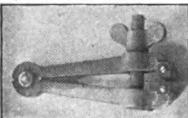


D 415.

ALFORD HAND VISE, No. 2.—6 1-2 Inch.

Without Tools.

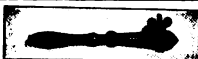
Price, each, without tools..... \$1.50



D 416.

HAND VISES WITHOUT HANDLES.

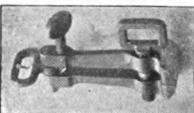
Size, inches.....	3	3½	4	4½	5	5½	6
No. 658. German Bright Steel Jaws, each.....	\$0.60	\$0.65	\$0.70	\$0.75	\$0.85	\$1.00	\$1.25
No. 660. German Cast Steel, Pol'd Jaws, each.....	.90	.90	.90	.90	1.10	1.40	1.70
Stubs' Hand Vises, each.....	1.20	1.30	1.40	1.60	2.00	2.40	3.40



D 417.

HAND VISES WITH HANDLES.

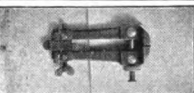
Size, inches.....	2	2½	3	3½	4	4½	5
No. 663. German Extra Quality Cast Steel, each.....	\$1.00	\$1.00	\$1.00	\$1.10	\$1.25	\$1.35	\$1.50



D 418. BILLINGS' NEW HAND VISE.

With Parallel Jaws.

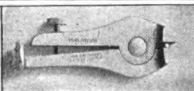
Vise, with loop, each \$2.50
Vise, without loop, for machinists, each 2.25



D 419.

COMMON HAND VISE.

Size 5-inch only, each..... \$1.50



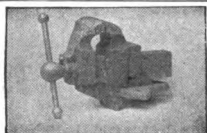
D 420.

THE PERFECT NIPPLE GRIP.

Nickel Plated.

No. 2. Grip for the repairer's use, each..... \$1.00

A coil spring between the jaws opens the latter just for the size of the flat nipple shoulder, and a slight turn of the thumb-screw secures a perfectly tight hold to any spoke nipple, never wearing off its corners. The support hook on the other end hangs right on to the spoke and gives the tool always its perfect position.



D 421.

PARKER'S PARALLEL VISES.—Round Jaws. Flat Base.

The steel faces of these Vises are milled and fitted to the jaws and are renewable at a trifling cost.

Number	000	1	2	3	4	5	6
Length of Jaws, inches	3¼	3½	4¼	4¾	5¾	6¼	8¼
Weight, lbs	23	31½	41½	59½	83	120	237
Price, each	\$6.25	\$7.00	\$9.00	\$11.75	\$16.25	\$24.00	\$50.00



D 422.

PARKER'S PATENT PARALLEL SWIVEL VISES.

Number	19	20	21	22	23	24	25	26
Length of Jaws, in....	2	2¼	3½	3¾	4¾	4¾	5¾	6
Weight, lbs	8	8½	23	35	48	63½	90	131
Price, each	\$4.00	\$5.00	\$7.00	\$8.75	\$11.00	\$14.50	\$20.50	\$30.00

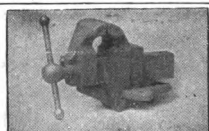
The steel faces of these Vises are milled and fitted to the jaws and are renewable at a trifling cost.



D 423.

PARKER'S OVAL SLIDE VISES.

Number	30	31	32	33	34	35	36
Length of Jaws, inches	2½	3	3¼	3½	4	4¾	5¼
Weight, lbs	8½	13	19	23	28	35	62
Price, each	\$2.50	\$3.00	\$4.25	\$4.75	\$6.50	\$9.50	\$12.00



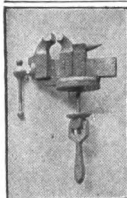
D 424.

PARKER'S GREEN VISES.—Parallel.

Without Parker's Improvements.

Special
Drills.
Made to
Order.

No ..	0000	100	200	300	400	500
Length of Jaws, inches	3¼	3¾	4¾	4¾	5¾	6¾
Weight, lbs	23	31½	41½	59½	83	120
Price, each	\$5.50	\$6.50	\$8.50	\$10.75	\$16.00	\$23.75



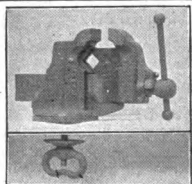
D 425.

PARKER'S GREEN VISES.—Swivel.

Without Parker's Improvements.

Number	2000	2100	2200	2300	2400
Length of Jaws, inches....	2¼	3¾	3¾	4¾	4¾
Weight, lbs	8½	23	35	48	63½
Price, each	\$4.00	\$6.25	\$8.00	\$10.00	\$13.25

The steel faces of these Vises are milled and fitted to the jaws and are renewable at a trifling cost.



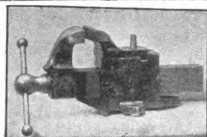
D 426.

PARKER'S COMBINATION VISES.

Without Parker's Improvements. Round and
Pipers' Jaws.

The steel faces of these Vises are welded on, and not fitted and renewable.

Number	187	188	188½	189½
Length of Jaws, inches	3¼	4	4¾	5¾
For Holding Pipe, inches	2 and under	3 and under	4 and under	6 and under
Weight, lbs	41	59	94	141
Price, each	\$16.00	\$20.00	\$28.00	\$35.00

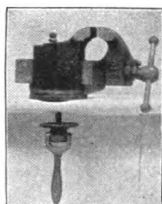


D 427.

PARKER'S

PATENT PARALLEL VICTOR VISE.

No..	370	371	372	373	374	375
Length of Jaws, inches	3¼	3¾	4¾	5	5½	6¼
Weight, lbs	25	39	57	73	98	150
Price, each	\$6.50	\$7.00	\$10.00	\$14.00	\$17.00	\$24.00



D 428.

PARKER'S PATENT SWIVEL VICTOR VISES.

These Vises have self-adjusting back jaws, which automatically adapt themselves for holding wedge-shaped pieces. The steel faces of these Vises are milled and fitted to the jaws, and are renewable at a trifling cost.

Number	270	271	272	273	274	275
Length of Jaws, inches	3¼	3½	4½	5	5½	6¼
Weight, lbs.	30	42	60	78	110	165
Price, each	\$7.00	\$8.50	\$12.50	\$16.00	\$19.00	\$27.00



D 429.

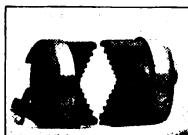
PARKER'S PATENT PARALLEL VISES.

Helmet Oil
Lubricates
Anything.

With Swivel Jaw, Giving Instant Adjustment to
Wedge-Shaped Pieces.

FLAT.				SWIVEL.			
No.	Length of Jaws.	Weight, Lbs.	Price, Each.	No.	Length of Jaws.	Weight, Lbs.	Price, Each.
170	3¼ inch	26	\$ 6.50	70	3¼ inch	30	\$ 7.00
171	3½ inch	38	7.00	71	3½ inch	44	8.50
172	4¼ inch	57	10.50	72	4¼ inch	66	12.50
173	4½ inch	80	14.00	73	4½ inch	90	16.00

D 430. THE "PEERLESS" (SWIVEL JAW) PIPE GRIP.

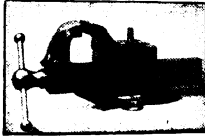


Adapted to any vise. Adjusts itself to whatever angle the object held may require.

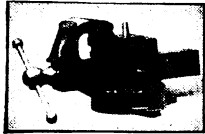
No. 1. For 3 to 4¼-in. Vise; holds ¼ to 2-in. pipe.....	\$2.50
No. 2. For 5 to 7-in. Vise; holds ½ to 5-in. pipe.....	2.75

D 431. PRICE OF REPAIRS FOR PARKER'S VISES.

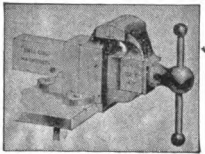
No. of Vise	Slide.	Back Jaw.	Screw	Spr'g	Nut.	Steel Jaws, Each	Pipe Jaws, Pr Set	No. of Vise	Slide.	Back Jaw.	Screw	Spr'g	Nut.	Steel Jaws, Each	Pipe Jaws, Pr Set
0000	\$3.00	\$4.00	\$3.00	\$5.00	\$5.00	\$5.00	....	171	\$3.50	\$5.50	\$3.00	\$5.00	\$5.00	\$5.00	....
000	3.50	4.50	3.00	.50	.50	.50	....	172	4.50	8.00	3.50	.50	.50	.50	....
1	4.00	5.00	3.00	.50	.50	.50	....	173	5.50	11.50	3.50	.50	.50	.50	....
2	5.00	7.00	3.00	.50	.50	.50	....	187	7.50	10.00	3.00	.50	.50	....	3.50
3	8.00	10.00	3.50	.50	.50	.50	....	188	8.50	12.00	3.50	.50	.50	....	4.00
4	9.00	13.00	4.00	.50	.75	.75	....	188½	12.00	16.00	4.00	.50	.50	....	5.00
5	16.00	20.00	5.00	....	.75	.75	....	189½	18.00	24.00	5.00	.50	.75	....	6.00
6	30.00	40.00	7.00	....	1.00	1.50	....	200	4.00	6.00	3.50	.50	.50	....	....
19	2.00	3.00	1.50	.50	.50	....	....	270	3.00	6.50	3.00	.50	.50	.50	....
20	2.50	4.00	2.00	.50	.50	....	....	271	3.50	7.50	3.00	.50	.50	.50	....
21	4.00	5.00	3.00	.50	.50	.50	....	272	4.00	12.50	3.50	.50	.50	.50	....
22	4.50	7.00	3.00	.50	.50	.50	....	273	5.00	15.50	3.50	.50	.50	.50	....
23	5.50	7.50	3.00	.50	.50	.50	....	274	11.00	22.50	4.50	.50	.75	1.00	....
24	6.50	10.50	3.50	.50	.50	.50	....	275	15.00	36.00	6.00	....	.75	1.00	....
25	10.00	18.00	4.00	.50	.50	.50	....	300	6.00	8.00	3.50	.50	.50	.50	....
26	19.00	24.00	6.00	....	.75	.75	....	370	3.00	5.50	3.00	.50	.50	.50	....
30	1.20	2.00	1.80	.50	.50	....	....	371	3.50	6.00	3.00	.50	.50	.50	....
31	1.50	3.00	2.00	.50	.50	....	....	372	4.00	10.00	3.00	.50	.50	.50	....
32	2.00	3.50	2.00	.50	.50	....	....	373	5.00	12.00	3.50	.50	.50	.50	....
33	2.50	4.00	2.00	.50	.50	....	....	374	11.00	19.00	4.50	.50	.75	1.00	....
34	3.00	6.00	3.00	.50	.50	....	....	375	15.00	28.00	6.00	....	1.00	1.00	....
35	4.50	8.00	3.50	.50	.75	....	....	400	8.00	12.00	3.50	.50	.75	.75	....
36	6.00	11.00	4.00	.50	.75	....	....	500	13.00	18.00	5.00	.50	.75	.75	....
70	3.50	6.00	3.00	.50	.50	.50	....	2000	2.00	2.50	1.50	.50	.50	.50	....
71	4.00	7.00	3.00	.50	.50	.50	....	2100	2.50	3.00	2.00	.50	.50	.50	....
72	4.50	12.00	3.50	.50	.50	.50	....	2200	3.50	6.00	3.00	.50	.50	.50	....
73	5.50	15.00	3.50	.50	.50	.50	....	2300	4.00	7.00	3.00	.50	.50	.50	....
100	3.50	4.50	3.00	.50	.50	.50	....	2400	5.50	8.50	3.50	.50	.50	.50	....
170	3.50	5.00	3.00	.50	.50	.50	....							

PRENTISS' PATENT ADJUSTABLE JAW VISES—Automatic Action.**D 432.****PRENTISS' STATIONARY OR FLAT VISE.**

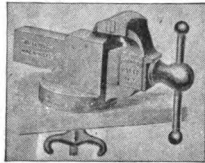
No.	Jaws	Opens.	Weight.
No. 1.	2 5/8 in.	3 1/2 in.	13 1/2 lbs. \$ 5.50
" 2.	3 1/2 "	4 3/4 "	28 " 7.00
" 2 1/2.	4 "	5 1/4 "	41 " 9.00
" 3.	4 1/2 "	6 "	54 " 10.50
" 4.	5 1/4 "	8 "	96 " 17.00
" 5.	6 "	9 "	146 " 24.00
" 6.	7 "	11 "	184 " 30.00

D 433. PRENTISS' PAT. SELF-ADJUSTING JAW SWIVEL BOTTOM VISE.

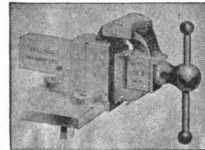
No.	Jaws	Opens.	Weight.
No. 18.	2 5/8 in.	3 1/2 in.	17 lbs. \$6.75
" 19.	3 1/2 "	4 3/4 "	32 " 8.50
" 19 1/2.	4 "	5 1/4 "	46 " 10.50
" 20.	4 1/2 "	6 "	65 " 12.50
" 21.	5 1/4 "	8 "	109 " 19.00
" 22.	6 "	9 "	168 " 27.00
" 23.	7 "	11 "	207 " 35.00

**PRENTISS NEW "BULL DOG" VISES.****D 434. Stationary Bottom.**

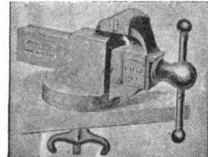
Number.	50	51	52	53	54	55	56
Lgth. Jaws, in.	3 1/4	3 3/8	4 1/8	4 3/8	5	5 1/2	6
Opens, inches	4	5	5 1/2	6 1/4	7	8 1/2	9 1/2
Weight, lbs.	22	28	42	52	72	100	135
Each	\$6.00	7.00	8.50	10.00	13.00	18.50	25.00

**PRENTISS NEW "BULL DOG" VISES.****D 435. Swivel Bottom.**

Number	90	91	92	93	94	95	96
Lgth. Jaws, in.	3 1/4	3 3/8	4 1/8	4 3/8	5	5 1/2	6
Opens, inches	4	5	5 1/2	6 1/4	7	8 1/2	9 1/2
Weight, lbs.	28	36	52	64	85	115	155
Each	\$7.50	8.75	10.50	12.50	16.00	22.00	30.00

**D 436.**

**PRENTISS' PAT.
SELF-ADJUSTING
JAW VISES,
FOR JEWELERS.**



Special
Taps
Made to
Order.

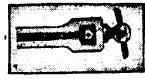
Stationary Bottom, Nos. 30, 32.**Swivel Bottom, Nos. 35, 37.**

No. 30, Stationary Bottom,	1 3/4 inch Jaws,	opens 1 3/4 inches,	each	\$3.50
No. 32, " "	2 " " "	2 " " "	"	4.00
No. 35, Swivel Bottom,	1 3/4 " " "	1 3/4 " " "	"	4.50
No. 37, " "	2 " " "	2 " " "	"	5.00

**D 437.**

"Dog" Fastening. for holding the screw, as shown in cuts.

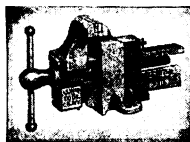
In ordering new **FRONT JAWS** for Prentiss' Patent Self-Adjusting Jaw Vises (only), always give the size (square) of the sliding bar of jaw, and state whether the broken part has "dog" or "collar" style of fastening.

**D 438.**

"Collar" Fastening.

D 439.**PRICES OF REPAIRS FOR PRENTISS' VISE.**

Vise Number	Body.	Front Jaw.	Back Jaw.	Screw & Lever	Nut.	Base.	Vise Number	Body.	Front Jaw.	Back Jaw.	Screw & Lever	Nut.	Base.
1 & 18	\$2.50	\$2.50	\$2.50	2.50	0.70	\$2.50	12 & 27	\$3.50	\$3.50	\$3.50	2.50	1.00	2.50
2 & 19	3.50	3.50	3.50	2.50	1.00	2.50	10 & 26	6.50	6.50	4.50	3.50	1.50	3.50
21 & 19 1/2	5.50	5.50	4.00	3.00	1.20	3.00	50 & 90	5.00	5.00	.....	2.00	1.50	.....
3 & 20	6.50	6.50	4.50	3.50	1.50	3.50	51 & 91	5.80	5.80	.....	2.50	1.60	.....
4 & 21	11.00	11.00	7.00	4.50	2.00	4.50	52 & 92	7.00	7.00	.....	3.00	1.70	.....
5 & 22	15.00	15.00	12.00	7.00	3.00	9.00	53 & 93	8.50	8.50	.....	3.00	2.00	.....
6 & 23	22.00	22.00	12.00	7.00	3.00	12.00	54 & 94	10.70	10.70	.....	4.00	2.60	.....
42 & 47	5.00	5.00	4.00	3.00	1.20	3.00	56 & 96	22.00	22.00	.....	6.00	4.00	.....



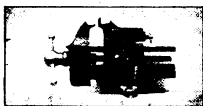
D 440.

LEWIS' PATENT VISES.

Stationary Bottom.

Parallel
Clamps
Make
Good
Drilling
Jigs.

Number.....	3	5	7	9	11	13	15	17	19
Width of Jaw, inches..	2½	3	3½	4	4½	5	5½	6½	7½
Opens, inches.....	3½	4	5	6	7	8	9	10	12
Weight, pounds.....	18	25	33	54	70	105	125	165	198
Price, each.....	\$5.50	\$6.25	\$7.00	\$9.00	\$10.50	\$16.00	\$18.00	\$24.00	\$30.00



D 441.

LEWIS' PATENT VISES.

Swivel Bottom.

Number.....	4	6	8	10	12	14	16	18	20
Width of Jaw, inches..	2½	3	3½	4	4½	5	5½	6½	7½
Opens, inches.....	4	4½	5	6	7	8	9	10	12
Weight, pounds.....	22	29	38	60	78	120	142	185	222
Price, each.....	\$6.75	\$7.50	\$8.50	\$10.50	\$12.50	\$18.00	\$21.00	\$27.00	\$35.00

D 442.

LEWIS' "HANDY" VISES.

With Anvil and Swivel Base.



Number.....	94	95	96
Width of Jaw, inches..	2½	3½	4¼
Opens, inches.....	3	4	6
Weight, pounds.....	11	18	30
Price, each.....	\$2.50	\$3.50	\$5.00

D 443.

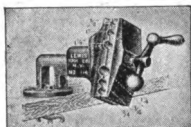
PRICES OF REPAIRS FOR LEWIS' VISE.

Vise Num'b'r	Body.	Front Jaw.	Back Jaw.	Screw & Lever	Nut.	Base.	Vise Num'b'r	Body.	Front Jaw.	Back Jaw.	Screw & Lever	Nut.	Base.
3 & 4	\$2.50	\$2.50	\$2.50	2.50	0.70	\$2.50	13 & 14	10.00	10.00	\$6.00	4.00	1.80	\$4.00
5 & 6	3.00	3.00	3.00	2.50	.80	2.50	15 & 16	11.50	11.50	7.50	5.00	2.00	5.00
7 & 8	3.50	3.50	3.50	2.50	1.00	2.50	17 & 18	15.00	15.00	12.00	7.00	2.50	11.00
9 & 10	5.50	5.50	4.00	3.00	1.20	3.00	19 & 20	22.00	22.00	13.00	7.00	3.00	11.00
11 & 12	6.50	6.50	4.50	3.50	1.50	3.50							

D 444.

LEWIS TOOL CO.'S "ACTIVE" VISE, No. 114.

Most Convenient Bicycle Vise in the Market.



This Vise is made especially for holding Bicycle frames and thin tubing of all kinds without danger of crushing or marring. As shown in cut, the jaws, which are wood-faced, can be revolved to any desired position when gripping crank is loosened; as there is a hard wood plate between back jaw and face of body, the friction is sufficient to hold work firmly in position when slight pressure of screw is applied. There are two spiral springs that hold jaws back against wood plate when they are loosened from work, preventing jaws from revolving too easily and adding to friction between jaws and body. These Vises are sold to be mounted on bench or with adjustable post, as shown on our No. 110 and No. 113. Holes in wood faces can be bored to any sizes ordered.

No. 114. Width of Jaws, 4½ inches; weight, 40 pounds.....each, \$7.00

No. 115. Adjustable Iron Post on which to mount above..... " 6.00

In ordering use Catalogue Number. No other description is necessary.



D 445.

GARDNER ROD VISE.

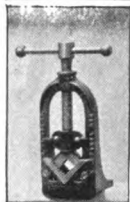
Holds Rod from 3-16 to 1 inch. Price.....\$4.50



**STEPHENS' PATENT
PARALLEL VISE.****D 446.**

Width of Jaw.	Price, Flat.	Price, Swivel.	Op'ns, Inch.	W'ght, Swivel.	W'ght, Flat.
2 in.....	\$3.00	\$3.75	2 1/4	3 lbs.	2 lbs.
2 " " Spring....	3.75	4.50	2 1/4	3 "	2 "
2 3/4 " " ".....	5.50	6.50	3	14 "	12 "
2 3/4 " " Spring....	6.00	7.00	3	14 "	12 "
3 1/2 " " ".....	9.00	10.00	5	42 "	35 "
4 1/2 " " ".....	12.50	14.50	6 1/2	65 "	60 "
5 1/2 " " Ext'n Hdle	22.00	26.00	9	120 "	110 "
6 1/2 " " ".....	33.00	39.00	11	175 "	160 "
9 1/2 " " ".....	140.00	150.00	14	420 "	380 "

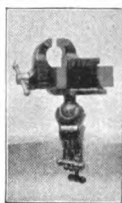
FILERS' VISES, same sizes and prices.

**PHOENIX PIPE VISES.**

Number.	0	1	5	10
Holds Pipe, Inches,	1/8 to 2	1/8 to 2 1/2	1/8 to 2 1/2	1/2 to 4
Each....	\$3.50	\$4.25	\$5.00	\$9.00

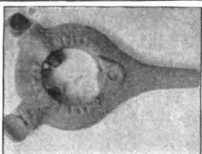
**D 447. Nos. 0-1.****D 448. Nos. 5-10.****WROUGHT
IRON
SOLID BOX
VISES.****D 449.**

No. and Weight, Pounds.	Width of Jaws, about Inches.	Price Each.	No. and Weight, Pounds.	Width of Jaws, about Inches.	Price Each.
25	3 1/4	\$12.00	105	6	\$23.00
30	3 1/2	11.00	110	6 1/4	24.00
35	3 3/4	10.00	115	6 1/2	25.00
40	4	10.50	120	6 3/4	26.00
45	4 1/4	11.00	125	6 1/2	27.50
50	4 1/2	11.50	130	6 3/4	29.00
55	4 3/4	12.00	135	6 3/4	31.50
60	5	13.00	140	7	33.00
65	5	14.00	145	7	35.00
70	5 1/4	15.00	150	7	36.00
75	5 1/4	16.00	160	7 1/4	41.50
80	5 1/2	17.50	170	7 1/4	44.50
85	5 1/2	18.50	180	7 1/2	47.00
90	5 3/4	20.00	190	7 3/4	53.00
95	5 3/4	21.00	200	8	56.00
100	6	22.00			

**D 450.****BALL CLAMP VISE.**

For Filers' Use.

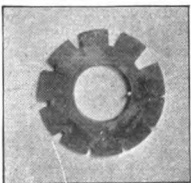
Width of Jaws, inches.....	1 1/2	2	2 1/2
Opens, inches.....	2 1/2	3 1/2	3 1/2
Price, each.....	\$4.00	\$6.00	\$7.50

**Milling
Cutters
Made for
Bicycle
Work.****D 451. SHARTLE'S BULL DOG.**

SIZES AND PRICES, EACH.

1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4
\$0.75	.90	1.05	1.20	1.40	1.65	1.90	2.15	2.50	2.85
3	3 1/4	3 1/2	4	4 1/2	5	5 1/2	6	7	8
\$3.30	3.80	4.40	5.10	6.00	7.00	8.00	9.00	10.00	11.50

The harder you pull, the tighter it holds.

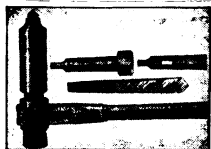
**D 452.****29° SCREW THREAD TOOL GAUGE.
"Acme Standard."**

This Gauge is for the purpose of furnishing a correct standard to which tools can be ground to cut threads, of a uniform angle, to take the place of square threads, and to standardize the threads of various angles and depths now in use. This thread has the same depth as, but is stronger than the square threads. The sides are at an inclination of 14 1/2° or 29 degrees included angle, which angle is the same as is now generally adopted in cutting worms. A tool-setting gauge is furnished with and included in the price of each gauge. Price, each

\$2.75

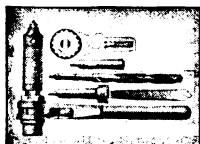
**PACKER****RATCHETS.****D 455.****Packer Boller Ratchets.****D 454. Packer Ratchets.**

Number	1	2	3	4	5
Length of Handle, inches.....	10	12	15	17	20
D 454.....price each,	\$10.50	\$13.50	\$16.00	\$19.00	\$23.00
D 455....."	9.00	10.50			

**PACKER RATCHET DRILLS.****D 456. With Taper Hole in Socket.**

These Ratchets will take Morse Taper Shank Drills or Morse Taper Sockets. Made in three sizes, numbers same as the regular Packer Ratchet and finished in the same thorough manner, all working parts are hardened.

No. 2. 12-inch Handle, taking No. 1 Morse Taper Socket or Morse Taper Shank Drills, from 5-8 to 29-32, inclusive.....	\$16.00
No. 3. 15-inch Handle, taking No. 2 Morse Taper Socket or Morse Taper Shank Drills, from 15-16 to 1 1-4, inclusive.....	20.00
No. 4. 17-inch Handle, taking No. 3 Morse Taper Socket or Morse Taper Shank Drills, from 1 9-32 to 2 inches, inclusive.....	25.00
Socket No. 1, for Taper Shank Drills, from 1-4 to 19-32, inclusive.....	1.50
" " 2, " " " " 5-8 to 29-32, ".....	2.00
" " 3, " " " " 15-16 to 1 1-4 ".....	2.50
No. 3. Flat Drill Socket for No. 2 Packer Ratchet, fitting No. 2 Taper Socket.....	1.75
" 4, " " " " 3 ".....	1.75
" 5, " " " " 4 Ratchet.....	2.00
" 2 Packer Ratchet with No. 1 Taper Socket will take Taper Shank Drills from 1-4 to 29-32, inclusive.	
" 3 Packer Ratchet with No. 1 and No. 2 Taper Sockets will take Taper Shank Drills from 1-4 to 1 1-4, inclusive.	
" 4 Packer Ratchet with Nos. 1, 2 and 3 Taper Sockets will take Taper Shank Drills from 1-4 to 2 inches, inclusive.	

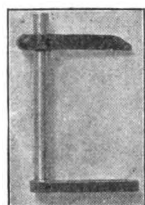
D 457. BILLINGS' DOUBLE ACTING RATCHET DRILLS.

These Drills are made in two sizes. They are Drop-Forged of the best bar iron and steel for the purpose, and are made to use Morse Taper Shank Twist Drill, also provided with Socket, with square hole for Square Shank Drill. This Drill can be changed from right-hand to left-hand drilling by simply moving the pawl to the right or left. The Sockets furnished with the drill can be utilized in any drilling spindle that may be fitted to receive them.

Socket No. 1 is fitted with Taper Shank to slide into No. 2 Socket, and purchasers procuring the No. 2 Ratchet with the three Sockets, can use the whole list of Drills. The Sockets used in these Drills can be used for Lathe work, being of correct Taper for the Morse Taper Shank Drills.

No. 1. 10 1/4-inch Handle, with one Socket taking Morse Taper Shank Drills from 1-4 to 29-32 in., incl., and one Socket for Flat Drills.....	\$14.00
No. 1. Without the two Sockets as above.....	11.00
No. 2. 13 1/4-inch Handle, with one Socket taking Morse Taper Shank Drills from 5-8 to 1 1-4 in., incl., and one Socket for Flat Drills.....	17.00
No. 2. Without the two Sockets as above.....	14.00
Socket No. 1, for Taper Shank Drills, from 1-4 to 19-32, inclusive.....	1.25
" " 2, " " " " 5-8 to 29-32, ".....	1.25
" " 3, for Flat Drills, for No. 1 Ratchet.....	1.75
" " 4, " " " " 2 ".....	1.75

For Taper Square Shank Drills fitting Ratchets, see page 29, D 165.

**D 458.****DRILLING POST.**

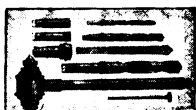
For use with Ratchet Drills.

It is made of wrought iron. The post is turned for the swinging arm, and the foot is planed square and has a slot in its full length for bolting down.

	No. 1	No. 2
Height of Post.....	20 inches	26 inches
Radius of Arm.....	10 "	12 "
Price, each.....	\$8.00	\$10.00

Badger
Die Stock
Always
Cuts
Same Size

D 459.

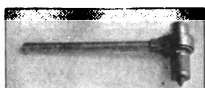
RENSHAW'S RATCHET DRILL.

Number	1	3
Length of Handles over all, inches ...	9½	18
Length from top of Spindle to bottom of Feed Collet.....	3	5
Length of Feed	1½	2¾
Price, each.....	\$11.00	\$15.00

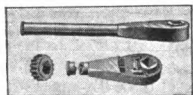
No. 1 has one collet for drills, with shank 11-32 inch square at shoulder, and one collet for drills, fitting No. 1 Morse's Standard Taper Socket. Weight, 16 ounces. Price, \$11.00. Discount for either collet, if not wanted, \$1.60. Weight, 1 ounce each.

No. 3 has one collet, No. 5, for drills, with shank 11-16 square at shoulder, of ½ to 1½ inches diameter, which are the extreme sizes that this ratchet is adapted to carry, and collets Nos. 1, 2 and 3, for Morse's Standard Taper Shanks. No. 3 and No. 5 collets are held in the spindle by screw-thread. No. 1 and No. 2 collets are tapered externally to fit No. 3 socket. Deductions will be made for collets, when not wanted, as follows: No. 1, weight 8 ounces, and No. 2, weight 6 ounces, \$1.10 each; Nos. 3 and 5, weight 8 ounces each, \$1.75 each. Price, with four collets, \$15.00. Weight, 8 pounds 14 ounces.

The No. 3 ratchet, for use of boiler makers, for whose use it is especially adapted, is provided with an extended feed-screw, having a knurled shank 3½ inches long, by which the ratchet may be held by hand in starting the drill, and fed by hand also. When this extended screw is substituted for the regular one, the price is not changed; if it is taken as an extra attachment, it is furnished at \$3.50. An adjustable friction feed attachment can be furnished for \$4.00.

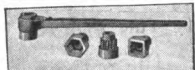
**D 460. PARKER'S RATCHETS.**

Length of Handle, in....	10	12	15	18	20
Parker's Ratchets.....	\$5.75	6.00	7.00	7.50	8.00
Parker's Boiler Ratchets	5.50	6.00			

**D 461. LOWELL RATCHET WRENCHES.**

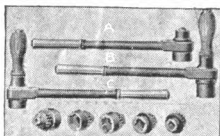
In ordering *Wrenches*, please state what *Gears* are desired, as a No. 1 Wrench may contain either a gear for ⅜, ½ or ⅝ square nut or for ⅝ or ¾ Hexagon.

Number	1	2	3	3½	4
Length of Lever, in	10	12	15	18	18
Size of Square Gear, in... ⅜, ½, ⅝	⅜, ½, ⅝	½, ⅝, ¾	¾, ⅞, 1, 1¼	¾, ⅞, 1, 1¼	1½, 1¾, 1¾, 1½
Size of Hexagon Gear, in... ⅝, ¾	⅝, ¾	¾, ⅞, 1	1, 1½, 1¼	1, 1½, 1¼	1½, 1½, 1¾
With one Gear only, each	\$3.00	\$4.00	\$5.00	\$6.00	\$7.00
Extra Gears, each.....	.50	.60	.75		1.00

**D 462. STEEL SOCKET BRIDGE WRENCH.**

Please order by size of nut, small diameter, rather than by size of bolt. *Odd sizes made to order.*

Number	1	2	3
Length of Lever, feet...	2	3	3
Handle will take Sockets for Square Nuts, in... 1½, 1½, 1½, 1¾, 2	2¼, 2½, 2¾, 3	3, 3¼, 3½, 3¾, 4, 4¼, 4½	
Handle will take Sockets for Hexagon Nuts, in... 1½, 1½, 1¾, 2	2¼, 2½, 2¾, 3, 3¼	3, 3¼, 3½, 3¾, 4, 4¼, 4½	
Price, with single Socket	\$8.00	\$14.00	\$20.00
Additional Sockets, each	1.50	2.00	4.50

**D 463. LOWELL BRIDGE WRENCH.**

We would call the attention of street railway builders, telephone and electric light companies to a new Wrench (see cut) designed for turning coach screws, nuts or bolts, either way, without taking off the wrench. These wrenches are easily changeable

for various sizes, by means of different sockets. Prices include only one socket.

No. 1. 12-inch handle, as shown in A.....\$1.75

No. 1. 12-inch handle, as shown in C.....2.00

The sockets for this wrench will turn nuts measuring (smaller outside diameter), 1-2, 5-8, 3-4, 7-8, 1, 1 1-16, 1 1-4 inch square. 3-4, 7-8, 1, 1 1-16, 1 1-4 inch hexagon. Extra Sockets, 40 cents each.

No. 2. 16-inch handle, shown in A or C.....\$3.00

The openings in these sockets are (smaller diameter), 1 1-16, 1 1-4, 1 7-16 inch, either square or hexagon. Extra Sockets, 75 cents each.

No. 3. 20-inch handle, like A or C.....\$4.50

With sockets to fit (smaller outside diameter) nuts 1 1-4, 1 7-16, 1 5-8, 1 13-16 inch, square or hexagon. Extra Sockets, \$1.00 each.

The cut B shows a long socket such as we make only to order.

The No. 3 is particularly adapted to handling nuts under the broad tread on street railway rails.

D 464.

C. H. BESLY HEAVY STEEL LATHE DOGS.

With Steel Screws. Lathe made and Hardened.



This Dog has a very heavy Boss, so that if the thread wears a heavier Screw can be substituted.

can be substituted.									
No.	Inch.	Price.	No.	Inch.	Price.	No.	Inch.	Price.	
1	$\frac{3}{8}$	\$0.40	9	$1\frac{3}{8}$	\$0.95	16	$3\frac{1}{2}$	\$1.80	
2	$\frac{1}{2}$	.50	10	$1\frac{1}{2}$	.95	17	4	2.10
3	$\frac{5}{8}$	.60	11	$1\frac{3}{4}$	1.10	18	$4\frac{1}{2}$	2.75
4	$\frac{3}{4}$	.60	12	2	1.20	19	5	3.25
5	$\frac{7}{8}$.70	13	$2\frac{1}{4}$	1.35	Full Set of 19			23.60
6	1	.70	14	$2\frac{1}{2}$	1.45	20 (Extra)	$5\frac{1}{2}$ in	4.00	
7	$1\frac{1}{8}$	.80	15	3	1.60	21 (Extra)	6 in	5.00
8	$1\frac{1}{4}$	.80						

One small set of 8, by $\frac{1}{4}$ to 2 inch..... 6.25

One small set of 12, by $\frac{1}{4}$ to 2 inch, continued by $\frac{1}{2}$ to 4 inch..... 13.20

To make a straight-tailed Dog, heat it to a bright red, and straighten on the anvil—do not make it any hotter. When ordering, state, as above, whether a full set, or a set of twelve, or a small set of eight.

D 465.

BILLINGS' DROP-FORGED LATHE DOGS.



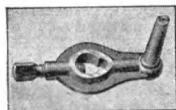
Badger
Die
Stocks
for
Bicycle
Use.

Size, in.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Price, each.....	\$0.50	.60	.70	.80	.95	1.10	1.25	1.40	1.60	1.80	2.00	2.30

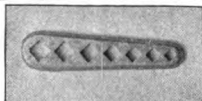
D 466.

AMATEURS' DOG.

For Small Lathes, Jewelers, Amateurs, etc. It is Steel, with Hardened Screws.



No. 1,	$\frac{3}{8}$ of an inch Bore	\$0.30
" 2,	$\frac{1}{2}$ " " "	.35
" 3,	$\frac{3}{4}$ " " "	.45
" 4,	1 " " "	.50

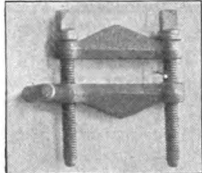


D 467. STEEL DOG WRENCH.

Fitting screw heads from $\frac{3}{8}$ to $\frac{3}{4}$ inch square.

Will answer for both Dogs and Tool Post.

Price, each..... \$0.75



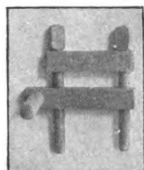
D 468.

BILLINGS' CLAMP DOG.

Number	1	2	3
Size between screws, inch.	$1\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$
Price, each.....	\$1.50	\$2.00	\$2.50

D 469.

LE COUNT'S CLAMP DOG.



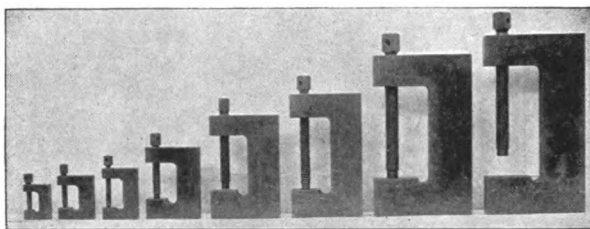
Number.....	1	2	3	4
Opens, inches.....	1	$1\frac{1}{2}$	2	3
Price, each.....	\$1.25	\$1.50	\$1.75	\$2.00
Full Set. \$6.50.				

These are made from the steel bar. They will carry all that can be put on them.

D 470.

PARALLEL CLAMPS.

All Steel and Case-Hardened.

Gardner
Die Stock is
Adjustable.

All surfaces are either parallel or at right angles to each other. Articles held in these clamps may have holes drilled parallel to each other, or at right angles to each other, without being removed from clamps. Articles held in these clamps may have surfaces generated parallel or at right angles to each other, without being removed from clamps.

Sizes.	Weight.	Each.	Sizes.	Weight.	Each.
1 inch.....	4½ ozs.....	\$0.75	3 inches, extra heavy.	4½ lbs.....	\$2.75
1¼ inches.....	8 ".....	1.00	4 ".....	5 ".....	3.00
1½ ".....	9 ".....	1.25	4 ".....	extra heavy.11 ".....	4.00
2 ".....	1¼ ".....	1.75	5 ".....	11½ ".....	5.00
3 ".....	2 ".....	2.00	6 ".....	11¾ ".....	6.00



D 471.

DIE DOG.

No. 1, 1¼ inches between sides.	Price, each,	\$3.00
Extra Dies, per pair.....		.50
No. 2, 2 inches between sides.	Price, each,	4.00
Extra Dies, per pair.....		.75
Screws, each.....		.10



D 472.

LE COUNT'S

STEEL CHUCK DRILL HOLDER.

If a plate is put under the Screw, in the tool post, to prevent bending, they will do good service.

No. 1, taking Drills from 3-8 to 9-16 inches.....	\$0.50
" 2, " " 9-16 to 3-4 ".....	.50
" 3, " " 3-4 to 1 1-8 ".....	.60
" 4, " " 1 1-8 to 1 5-8 ".....	.75
" 5, " " 1 5-8 to 2 ".....	.90
Per Set.....	3.25



D 473.

BILLINGS'

DROP-FORGED MACHINISTS' CLAMP.

No. 1, opening 1¼ inches, each.....	\$1.50
" 2, " 2¼ ".....	2.00
" 3, " 3¼ ".....	2.50
" 4, " 4¼ ".....	3.00
Extra Screw, No. 1, 10c.; No. 2, 12c.; No. 3, 15c.; No. 4, 20c. each.	



D 474. STEEL MACHINISTS' CLAMP.

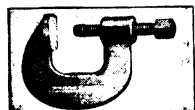
Will Stand the Severest Test.

Extra heavy, with Button on end of Screw, hung on a ball so as to accommodate itself to irregularities without bending the screw. The foot of the clamp is planed.

Number.....	1	2	3	4	5	6	7	8	9	10	11
Opening, inches.....	2	3	4	5	6	8	10	12	14	16	18
Price.....	\$1.75	2.00	2.25	2.50	2.75	3.25	3.75	4.25	5.00	6.00	7.00

D 475.

BILLINGS' DROP-FORGED STEEL C CLAMP.



Number....	1	2	3	4	5
Opens.....	1¼	2¼	3¼	4¼	6½
Weight.....	5 oz.	2 lbs.	5¼ lbs.	7½ lbs.	11½ lbs.
Price, each..	\$1.00	\$2.00	\$2.50	\$3.25	\$4.00
Extra screws	.10	.15	.20	.30	.40

STANLEY RULE AND LEVEL CO.



HAND-Y PLUMBS AND LEVELS.

D 486. With Ground Glasses.

Level, Arch Top Plate, Two Brass Lipped Side Views, with Ground Glasses; 24 to 30 inch; per dozen, \$35.00; each..... \$3.50

D 487.

No. 90. Mahogany Plumb and Level, Arch Top Plate, Two Brass Lipped Side Views, Tipped, with Ground Glasses; 24 to 30 in.; per dozen, \$39.00; each..... 3.90

D 488.

No. 95. Brass Bound, Mahogany Plumb and Level, Two Brass Lipped Side Views, with Ground Glasses; 24 to 30 in.; per doz., \$72.00; each, 7.20

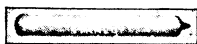
D 489.

No. 96. Brass Bound, Rosewood Plumb and Level, Two Brass Lipped Side Views, with Ground Glasses; 24 to 30 inches; doz., \$80.00; each, 8.00

D 490.

No. 98. Brass Bound, Rosewood Plumb and Level, Two Brass Lipped Side Views, with Ground Glasses; 12 inches; per doz., \$48.00; each. 4.80

Packed separately, in paste-board boxes. In ordering, dealers should designate the lengths of the Levels wanted—24, 26, 28 or 30 inch.

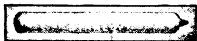


D 491. PROVED LEVEL GLASSES.

Made of extra thick tubing. By a patented process, each Level Glass receives an indelible mark at its highest, or crowning point in the center; and the owner can thus easily set the glass accurately in its proper position.

Size, inches.....	1 1/4	2	2 1/4	3	3 1/4	4	4 1/4	Assorted 1 1/4, 3, 3 1/4
Price, per dozen....	\$0.95	\$1.00	\$1.05	\$1.15	\$1.30	\$1.45	\$1.60	\$1.20
Price, each.....	.10	.10	.10	.12	.13	.15	.16	.12

Packed one dozen in a box.



D 492. GROUND GLASSES.

The inside surfaces of these Glasses are ground perfectly smooth; and thus the bubble is made extremely sensitive.

Size, inches.....	1 1/2	1 3/4	2	2 1/4	3	3 1/4	4	4 1/4	5
Price, per dozen....	\$5.00	\$5.00	\$6.00	\$6.00	\$7.00	\$7.00	\$8.00	\$9.00	\$10.00
Price, each.....	.50	.50	.60	.60	.70	.70	.86	.90	1.00

All Glasses above 3 inches, Double Lines. All Glasses above 4 inches, Four Lines.



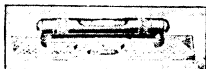
HEXAGON POCKET LEVELS.

D 493. With Detachable Base-Piece.

No. 33. Nickel Plated, with Ground Glasses, complete; one in box; ea., \$1.25

D 494.

No. 33 1/2. Hexagon Pocket Level, Nickel Plated, 2 1/2 in., with Ground Glasses; one in a box; each, \$0.75
Base-pieces, 3 1/2 inch, if ordered separately..... .50



ECLIPSE LEVELS.

A convenient tool for machinists, electricians and expert mechanics or amateurs.

The outer shell of the Level can be turned, so as to completely protect the glass from damage when not in use. One in a box.

D 495.

No. 34.	4-inch Eclipse Level, Nickel Plated, with Ground Glasses; each,	\$1.25
"	6 " " " " " " " " " " " "	1.50
"	8 " " " " " " " " " " " "	2.00
"	10 " " " " " " " " " " " "	2.50

ECLIPSE V LEVELS FOR SHAFTING, ETC.

D 496.

6-inch, each..... \$1.50 | 10-inch, each..... \$2.50



STANLEY'S IMPROVED MARKING AND MORTISE GAUGE.

This Gauge is made of metal, and has two graduated bars. The steel points are attached very near the ends of the bars, to admit of being used close up into a rabbet, or corner.

D 497.

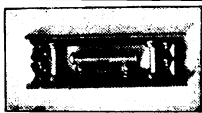
No. 91. Nickel-plated Marking and Mortise Gauge; one in box; each... \$0.65



MACHINISTS' PLUMB AND INCLINOMETER.

D 508.

No. 1. 6 in. long	each, \$2.00	No. 3. 18 in. long	each, \$3.00
No. 2. 12 in. long	" 2.50	No. 4. 24 in. long	" 3.50



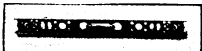
D 509.

DOUBLE PLUMB AND LEVEL.

No. 6. 6 inches long	each, \$2.00
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D 510.

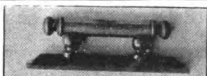
DOUBLE PLUMB AND LEVEL.



No. 7. 12 inches long	each, \$2.25
No. 8. 18 inches long	" 2.50
No. 9. 24 inches long	" 3.00

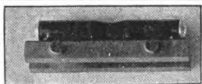
No. 09. Carpenters' and Machinists' adjustable Plumb, Level and Inclinometer combined, 24 inches long

each, \$6.00



D 511. ADJUSTABLE BENCH LEVEL.

No. 10. 4 inches long	each, \$0.50
No. 12. 5 inches long	" .75



D 512.

BENCH LEVEL.

For Square or Straight Edge.

No. 11. 4 inches long	each, \$0.75
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D 513.

POCKET LEVEL.

No. 14. 3 inches long	each, \$0.25
No. 15. 5 inches long	" .35

D 514. POCKET LEVEL FOR SQUARE OR STRAIGHT EDGE.



This Level can be attached to a Square or Straight Edge the same as No. 11. It will be found accurate, useful, durable and cheap.

No. 17. 3½ inches long	each, \$0.30
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D 515.

LEVEL GLASSES.

Inch	1 to 1¾	2	2½	3	3½	4
Per dozen	\$0.95	\$1.00	\$1.00	\$1.25	\$1.35	\$1.50
Each10	.10	.10	.15	.15	.25

D 516.

NICKEL-PLATED POCKET LEVEL.



2½ inch	each, \$0.30	per dozen, \$3.00
3 inch	" .40	" 3.65
3½ inch	" .50	" 4.20



D 517.

STANLEY MACHINISTS' LEVEL, No. 39½.

6 inches long, N. P. Iron	each, \$0.75
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D 518.

STRATTON'S PATENT LEVELS.

No. 10. Machinists' Level.

The Machinists' Levels have brass side views, heavy brass top and end plates, and brass corners, rosewood, polished. each.



No. 10. 6½ in. long, without Plumb, \$1.10	each.
No. 10. 8 " with " 2.00	
No. 10. 10 " " 2.40	
No. 10. 12 " " 2.60	

MILLER'S FALLS GOODS.



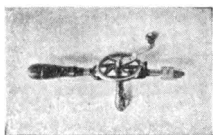
D 519. MILLERS' HAND DRILLS.

These Drill Stocks are made of malleable iron, with steel spindle and rosewood head and handle. The jaws are of forged steel, and will hold perfectly

any size drills named. They are the only Drill Stocks in use which hold such a variety of Morse Twist Drills.

No. 1. Single Gear, hollow handle, holds 1-32 to 1-8 Drills, each	\$1.25
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Special
Taps,
Any Size,
Made to
Order.

MILLER'S FALLS GOODS.**D 530. HAND DRILL No. 2.**

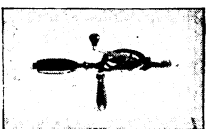
The chuck of this Drill Stock is the same style as the No. 1, but will hold $\frac{1}{4}$ inch drills and all smaller sizes. It has cut gears, is heavily nickel plated, with rosewood head and handle. The Head is hollow and contains six drill points.

Price, with 6 drill points, each \$2.50

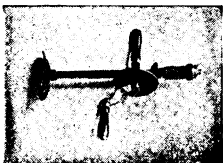
**D 531. HAND DRILL No. 4.**

This Drill Stock is eight inches in length, and weighs eight ounces. It is made of iron with rosewood handle, and brass chuck for holding the drill points. With each Drill Stock we send a box containing six superior drill points, of various sizes.

Price of Stock and Drills, each \$0.50

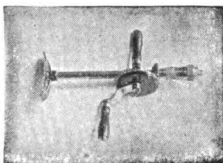
**D 532. HAND DRILL No. 5.**

We offer this Drill as a substitute for Nos. 1B-3 and 3B described in previous catalogues. No. 5 has all the advantages of the other numbers mentioned, and in addition has a wide-rimmed gear to be grasped between thumb and fingers when the drill is used for delicate work. In this manner it can be run without liability of breaking points. It is double-gear, $11\frac{1}{2}$ inches in length and weighs 20 ounces. With the Drill we furnish six points of same style as are put up with our Automatic Borers. Price, each...\$1.80; Per dozen...\$18.00

**D 533. BREAST DRILL No. 10.**

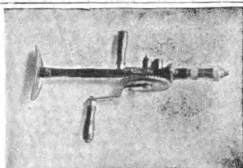
This Drill is now made of round wrought iron, $\frac{5}{8}$ of an inch in diameter. The handles are rosewood, the head malleable iron, and the chuck jaws of steel. It has a changeable gear, one even and the other speeded three to one. The chuck will hold any shape shank, round, square or flat. The Drill Stock has cut gears, and is heavily nickel plated. An extra set of steel jaws goes with each

Drill Stock, for holding small, round drills. Price, each.....\$3.00

**D 534. BREAST DRILL No. 11.**

This Drill Stock is the same as No. 10, but the chuck will only hold round shank drills. Being limited in its range, it holds drills from 1-32 to 1-4 inch very firmly and true, and is a most perfect tool, heavily nickel plated, with rosewood handles. The gears are cut.

Price, each \$3.00

**BREAST DRILL No. 12.**

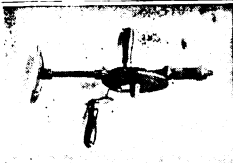
Changeable gear from even, to speeded about 3 to 1.

This Drill has been greatly improved recently. As now made the drive wheel is 5 inches in diameter. The gears are cut from solid metal, and run almost

D 535. Front.

Gardner
Die Head
Cuts
Accurate
Threads.

absolutely perfect. A roller is placed at back of drive gear, which makes it equally as firm and substantial as a double geared drill. The crank is adjustable to three different lengths, and is held in place by a round head thumb screw with milled edges, which give the drill an attractive appearance. The drive gear is held by similar screw. The chuck is nicked and has our new Alligator jaws suitable for both round and square shanks. The handles are cocobola. A level attachment enables the operator to see when the drill is held true. Price, each \$2.50

**D 536. BREAST DRILL No. 13.**

This is the largest Single Crank Drill in the market, the drive-wheel being six inches in diameter, giving a speed of four and one-half to one. It is double-gear and most perfect in every part. It has cut gears, steel stock, rosewood handles, steel jawed chuck which will hold any size square and round tool shanks. It is heavily nickel plated and

really the most expensive Breast Drill in the market. An extra set of steel jaws with each, for holding small, round drills. Price, each..... \$4.00

D 547. No. 6.

GOODSELL'S BREAST DRILL.



Goodsell's Breast Drill No. 6 has a three-jawed chuck, capacity 0 to $\frac{1}{2}$ inch. It is double-gearred, one gear remaining "idle" and acting as an anti-friction bearing when the other is at work. *All gears have cut teeth. It has two speeds.* The breast-plate is adjustable and its position can be changed if desired. Each drill packed in a wooden box. Price, each \$4.00

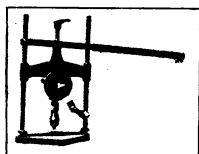
D 548. No. 7.

GOODSELL'S BREAST DRILL.



This Drill is the same in every particular as No. 6, *except* it has chuck with two sets of jaws, one for square shanks and one for round shanks. The jaws are steel, carefully tempered. It has *cut* gears, two speeds; adjustable breast-plate and perfect mechanism. Packed in wooden boxes. Price, each...\$3.50

Paral
Clamp
Hold
Work
True.



D 549. MOUNTED BREAST DRILL.

This is our No. 10 Breast Drill mounted in a steel frame. Most of the work done by a Breast Drill can be done better with the drill mounted in the frame. When used against the breast it often requires a heavy pressure, which is very fatiguing to the workman. In this arrangement there is a leverage of five to one, which makes the feeding an easy matter. When work is required which cannot be done in the frame the drill can be taken out in two seconds and used in the ordinary way.

The upright rods of the frame are $\frac{5}{8}$ round steel, 16 inches high and 8 inches apart. As seen in the cut, the drill is held true by the frame, and the work held firmly in place by the clamp. The lever feed is operated by hand, or a weight may be used. The Drill Stock is of $\frac{5}{8}$ round steel, heavily nickel plated. The gears are cut and are changeable from even to a speed of three to one, as may be desired. The handles are rosewood. The jaws of the chuck are forged steel and will hold any size or shape shank—round, square, or flat. We also put in an extra set of steel jaws for small, round drills only. The Drill Stock can be put in or out of the frame by the half turn of a thumb nut. This is the most beautiful and useful tool which has been put on the market for many years. Price, complete.....\$6.00

D 550.

DRILL BRACE. ANTI-FRICTION COLLAR.



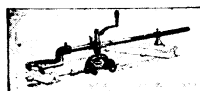
This is a Ratchet Brace with gear wheels speeded about three to one for drilling. Ten inch sweep. Made of steel and heavily nickel plated, with rosewood handle and lignum-vitæ head. The jaws are forged steel and will hold drills 1-8 to 7-16 inch diameter; also square shank drills and bits of all sizes. An extra set of steel jaws for holding round shank drills of 1-8 inch or less in diameter, is furnished with each. The drill handle and gear is readily detached when desired. Price, each.....\$3.00

shank drills of 1-8 inch or less in diameter, is furnished with each. The drill handle and gear is readily detached when desired. Price, each.....\$3.00

D 551. PATENT UNIVERSAL ANGULAR BIT STOCK.

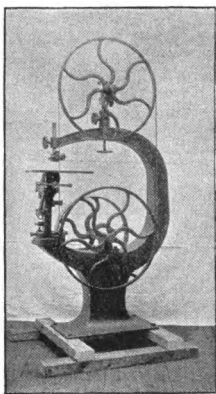


The Universal Angular Bit Stock is presented to the public as a time economizer, to be used in connection with a Brace and a Bit for boring holes in places where the Brace and Bit alone could not be used. As will be seen, it can be placed in many angles or positions. The ability to vary the angles, either at the commencement or during the operation of boring a hole, is an important feature. Price, per dozen\$24.00

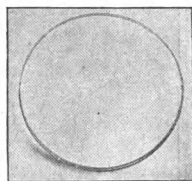


D 552. TRACK DRILL No. 5.

Large quantities of our Angular Drilling Machines have been used for track work, viz.: For drilling holes through rails for electric bonding wires, and for binding rods, etc. We find that a horizontal shaft, as shown in the cut is more suitable for the work referred to, than the upright standards furnished heretofore, and we are now prepared to execute orders for this new pattern. Engineers and others familiar with the work the Drill is intended for, will at a glance see its utility and convenience. Two sets of gears go with each Drill, making it either speeded or geared back. It weighs 68 pounds and will carry drills up to 1 inch. We carry in stock a full line of Twist drills with shanks turned to $\frac{1}{2}$ inch to suit hole in the spindle of machine. A chuck is furnished with each machine which will hold drills smaller than $\frac{1}{4}$ inch. Price, each.....\$25.00

BAND SAW FOR METALS.**D 564.**

This machine is provided with a vise for holding rods, bars, or other stock that requires to be clamped. The vise is adjustable so that by swinging the jaws slightly out of line the rods to be cut will pass in front of the back run of the saw, and stock may be cut to any length that may be desired. It is also provided with a table held in the jaws of the vise for use in cutting up sheet metals and for general band-saw work.

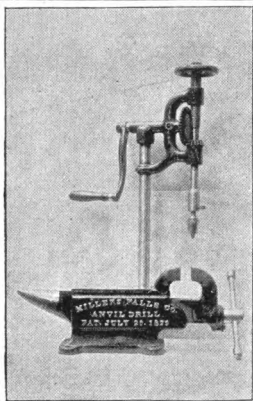
**D 563. Saws.****THE SAW GUIDE.**

By means of the saw guide the saw may be turned out of line with the face of the wheel and at a right angle with the jaws of the vise when set for cutting up long stock. By an adjustment of the guide the saws may also be prevented from running and a square cut secured.

The "feed" is automatic and adjusts itself to the amount of metal being cut. The saws are so tempered that the liability to breakage is reduced to a minimum, the cutting edge having the usual hack saw temper while the back is drawn very much lower. We make three grades of saws: Coarse, for large work; medium, for ordinary stock cutting; fine, for sheet metal or any stock less than 3-16 inch thick. For general use the saws should run about one hundred feet per minute or eighteen revolutions of the shaft. For the softer metals the speed may be considerably increased.

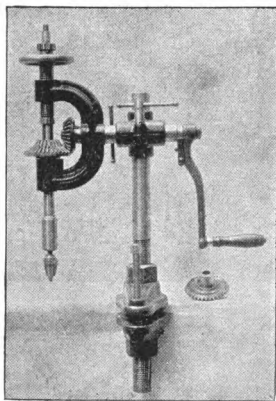
Having used one of these machines several months in our own work we do not hesitate to guarantee that it will do more work than any other now on the market, and at less cost for saws and labor.

Price of Machine....\$50.00 Saws, each.....\$0.90 Counter Shaft....\$5.00

**D 565.****D 565.****ANVIL, VISE AND DRILL.**

Gardner
Grinder
for Flat
Grinding.

The anvil has a steel face 4x8 inches. Vise jaws $3\frac{1}{2}$ inches wide and steel faced. Steel Drill Press with adjustable chuck to hold $\frac{1}{4}$ inch drills and all smaller sizes. We have for sale Morse Twist Drills from $\frac{1}{4}$ to $\frac{3}{4}$ inch with uniform $\frac{1}{2}$ inch shanks which fit into the spindle when the chuck is removed. One of these drills for a sample goes with each machine.

**D 566.****D 566. Improved Patent Universal Angular and Ratchet Drilling Machine.**

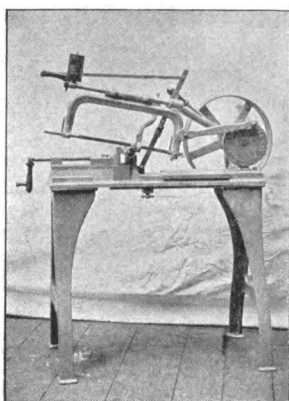
These Drilling Machines are now made of steel, and are first class in all respects. For repair work in mills they are almost indispensable, as they can be attached to a broken machine without taking it apart, and swung around to drill at any angle.

By placing the crank on the drill spindle, it will work with a ratchet or without. We send a chuck with each machine, which will hold 1-16 to 1-4 inch drills.

No. 1.	Weight, 34 lbs.	Drills up to $\frac{5}{8}$ inch hole.....	Price, \$20.00
No. 2.	" 64 "	" " 1 " "	" 25.00
No. 3.	" 108 "	" " $1\frac{1}{2}$ " "	" 40.00

The No. 2 Drill has two sets of gears, making either speeded or geared back machine.

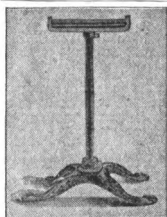
D 578.

MILLERS' FALLS POWER HACK SAW.

This machine is designed for cutting iron and steel. It will cut any size up to $4\frac{1}{2}$ inches in diameter, and any shape that can be held in the vise. It also cuts piping very nicely. We do not claim great speed in cutting, but metal can be cut much more rapidly in this machine than can be done in a lathe or planer, or by heating and cutting with a "Blacksmith's Hack," and at a trivial cost. By its use a good percentage of metal is saved, as the pieces cut are left smooth and no labor or metal is lost in squaring up, as is the case after heating and cutting with the "hack." This saving in Hobson's, Jessop's or other high cost steels is quite an item in stock, to say nothing of the labor. For cutting up die blocks and a thousand and one other things, the advantage of using this saw will be manifest.

The blades used for cutting are the Star Hack Saws, 10, 11 and 12 inches in length. The only expense is the comparatively slight wear of these blades, and the little time taken in securing the stock to be cut in the vise to the machine and setting the latter in motion. No attention is required until the piece is cut off. The expense of blades is small, as one blade will cut off a steel shaft $4\frac{1}{2}$ inches in diameter several times. The machine should be run from forty-five to fifty revolutions per minute. It is certainly a valuable labor saving tool for the Blacksmith shop, the Tool or Machine room, as it can be put to many uses not at once suggested to the mind. All who are using this machine are enthusiastic in its praise, as demonstrated by the following instance, which is but one of many of a kindred nature: On October 1st, 1891, we shipped the Hartford Machine Screw Co., of Hartford, Conn., one of the Power Saws, and on the 10th of the same month received an order from the same parties for four more machines with the remark, "We shall be glad to do what we can to increase their popularity."

Price, each\$25.00



D 579.

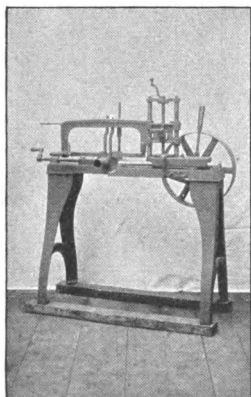
HACK SAW REST.

Bonanza
Oil Cups
are Good.

We also manufacture a Rest, adjustable to various heights, to be used when long pieces are cut in the Power Hack Saw.

Price, each\$1.50

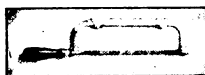
D 580.

THE Q AND C POWER HACK SAW.

It will cut all kinds and sizes of metal up to 5 inches in diameter. It is an improvement over any Power Hack Saw in the fact that it has a positive feed, which is entirely automatic, and can be instantly changed in speed to accommodate hard or soft metal, large or small. It is a well known fact that all other Power Hack Saws depend entirely upon gravity to feed the saw through the work, and as the weight of the saw frame cannot be increased, the cutting speed rapidly decreases as the size of work increases. The "Q" and "C" Saw, having an automatic screw feed, adjustable to all kinds of work, the same cutting speed is maintained throughout. It is also a well known fact that on the old style machines the saw blade drags backward on the work with nearly if not quite as much pressure as when on its forward movement, and dulls the saw very rapidly. Our saw frame, having a perfectly horizontal motion, DOES NOT drag back on the work,

actually saving 50 per cent. of the wear.

Price, each\$25.00



D 591. Nos. 0 and 1.

STAR HACK SAWS.

All steel, adjustable so as to face the blade in four different directions.



D 592. No. 2.

Dies, Special Shapes and Threads, Made to Order.

Patent staple-shaped pins hold the blades in the frame.

D 591. No. 0.	Steel Extension Frame, for 10, 11 and 12 inch blades.	each, \$1.25
D 591. No. 1.	" " " " " 6, 7, 8 or 9 inch blades.	" 1.00
D 592. No. 2.	Solid Frame, for 8 inch blade only.	" .80



No. 4A.

STAR HACK SAWS.

Cast Iron Frame.



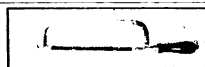
No. 4B.

Face in four directions. The pins which hold the blade cannot drop out.

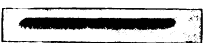
No. 4A. For 8 inch blade, each.	\$0.50	No. 4B. For 9 inch blade, each.	\$0.50
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**D 594. PATENT STAR HACK SAW No. 9.**

Holds blades from 8 to 12 inches. Extension frame covered by a steel sheath. The blades face either direction. Nickeled. Price per doz. \$12.00

**D 595. PATENT STAR HACK SAW No. 10.**

Extension Frame. Light and quickly adjusted, having strength in the middle. Tempered steel, polished and nickel plated. It carries blades 6 to 12 in. long. Per doz. \$12.00

**D 596. STAR HACK SAW BLADES.**

With 14 Points for Regular Use. With 23 Points for Tubing.

Length of Blade.	6	7	8	9	10	11	12	Assorted, 6 to 9
Price, per dozen.	\$0.55	\$0.60	\$0.65	\$0.70	\$0.85	\$0.95	\$1.05	\$0.65
Price, per gross.	6.60	7.20	7.80	8.40	10.20	11.40	12.60	7.80

We fill orders with the coarse blades unless the fine ones are named.

**D 597. YANKEE HACK SAW BLADE.**

Tempered by new process. The back of the saw blade is flexible (or without temper) so that when in use it is impossible to BREAK it.

Length of blade.	6	7	8	9	10	11	12
Price, per dozen	\$0.55	\$0.60	\$0.65	\$0.70	\$0.85	\$0.95	\$1.05

D 598.**STUBS' HACK SAW BLADES.**

Length of blade.	6	7	8	9	10	11	12	13	14	16
Price, per dozen.	\$2.00	\$2.50	\$3.00	\$3.50	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00	\$8.00
Price, each.	.20	.25	.30	.35	.40	.45	.50	.55	.60	.80

**D 599. THE "SUPERIOR" HACK SAW.**

The frame is constructed so as to face the blade in four different directions. Any make of blades will fit this frame. Frame hand made.

To hold blades.	6	7	8	9	10	11	12 inch.
Price, each frame	45c.	45c.	50c.	55c.	60c.	60c.	65c.
Blades, per dozen	65c.	70c.	75c.	80c.	90c.	95c.	\$1.00

**ROBINSON MALLEABLE IRON HACK SAW FRAME.**

D 600.

Takes 8 inch blades. Price, each \$0.75

**D 601. HAND HACK SAW FRAME.**

Takes 8 inch blades. Price, each \$0.50

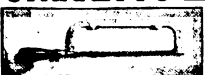
D 602.**THE GRIFFIN HACK SAW.**

One Dozen Blades with Each Frame.

Inches	6	7	8	9	10	12
Per doz. frames.	\$14.00	15.00	16.00	17.00	18.00	20.00
Each frame.	1.40	1.50	1.60	1.70	1.80	2.00
Per gross, blades.	\$9.25	10.00	10.50	11.25	12.00	13.25
Per dozen, blades	.90	1.00	1.05	1.12	1.20	1.33

GRIFFIN'S BLADES.

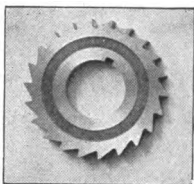
D 603.

**STARRETT'S EXTENSION BACK HACK SAW FRAMES.**

Saw instantly removed. Quickly set at any angle.

No. 140. Nickeled. For 8 inch saws only.	..... \$0.90
No. 145. Nickeled. For 8 to 12 inch saws.	..... 1.25

D 604.

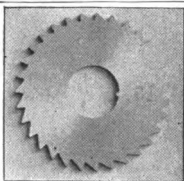
BROWN & SHARPE MFG. CO. TOOLS.**D 614. MILLING CUTTERS.**

Helmet
Bronze
Makes
Stiff
Springs.

Cutters of 1 inch face and over, have teeth of a spiral form.

Cutters varying from the following list, are made to order, of any required size.

Diam. Cutt'r Inch.	Price Each Cutt'r	Wid h Face, Inch.	Size Hole, Inch.	Diam. Cutt'r Inch.	Price Each Cutt'r	Wid'h Face, Inch.	Size Hole, Inch.	Diam. Cutt'r Inch.	Price Each Cutt'r	Wid'h Face, Inch.	Size Hole, Inch.
2 1-4	\$1.75	1-2	7-8	2 3-4	\$6.00	4	1 1-4	3 1-2	\$4.75	1	1 1-4
"	2.50	1	"	"	10.00	6	"	"	5.15	1 1-4	"
"	2.30	1 3-4	"	2 7-8	2.20	11-16	1	"	5.60	1 1-2	"
"	1.30	3-16	1	"	2.30	3-4	"	"	6.00	1 3-4	"
2 1-2	1.30	3-16	"	"	2.50	7-8	"	"	6.40	2	"
"	1.40	1-4	"	3	2.10	3-8	1 1-4	"	6.90	2 1-2	"
"	1.50	5-16	"	"	2.25	7-16	"	"	7.40	3	"
"	1.60	3-8	"	"	2.40	1-2	"	"	8.15	3 1-2	"
"	1.70	7-16	"	"	2.55	9-16	"	"	9.15	4	"
"	1.80	1-2	"	"	2.70	5-8	"	"	10.40	5	"
"	1.90	9-16	"	"	2.85	11-16	"	"	11.90	6	"
"	2.00	5-8	"	"	3.00	3-4	"	4	3.90	1-2	"
"	2.10	11-16	"	"	3.30	7-8	"	"	4.10	9-16	"
"	2.20	3-4	"	"	3.60	1	"	"	4.30	5-8	"
"	2.30	13-16	"	"	4.00	1 1-4	"	"	4.50	11-16	"
"	2.40	7-8	"	"	4.30	1 1-2	"	"	4.70	3-4	"
"	2.60	1	"	"	4.50	1 3-4	"	"	5.15	7-8	"
"	2.90	1 1-4	"	"	4.70	2	"	"	5.65	1	"
"	3.10	1 1-2	"	"	5.20	2 1-2	"	"	6.25	1 1-4	"
"	3.40	1 3-4	"	"	5.40	3	"	"	6.65	1 1-2	"
"	3.70	2	"	"	5.90	3 1-2	"	"	7.05	1 3-4	"
"	4.10	2 1-2	"	"	6.40	4	"	"	7.45	2	"
"	4.50	3	"	"	7.80	5	"	"	8.40	2 1-2	"
"	5.00	3 1-2	"	"	10.80	6	"	"	9.00	3	"
"	5.50	4	"	3 1-2	3.15	1-2	"	"	10.00	3 1-2	"
2 5-8	1.70	3-8	"	"	3.30	9-16	"	"	11.00	4	"
"	1.80	7-16	"	"	3.45	5-8	"	"	13.50	5	"
2 3-4	1.90	1-2	"	"	3.65	11-16	"	"	15.50	6	"
"	2.00	9-16	"	"	3.85	3-4	"	"	9.00	3	1 1-2
"	2.10	5-8	"	"	4.35	7-8	"	"	15.50	6	"

**D 615. METAL SLITTING SAWS.**

These are thin MILLING CUTTERS with the sides ground true. They are hardened to cut metals. They are a little thicker at the outer edge than near the center, so as to give a proper clearance in cutting deep slots.

In ordering *special* saws please state for what purpose they are required.

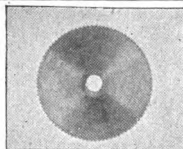
Diam. Inches.	Price Each.	Thickn'ss Inches.	Hole, Inches.	Diam. Inches.	Price Each.	Thickn'ss Inches.	Hole, Inches.
2 1-2	\$1.00	1-32	7-8	4	\$1.25	1-16	1
"	1.00	3-64	"	"	1.20	3-32	"
"	.90	1-16	"	"	1.20	1-8	"
"	.90	3-32	"	5	1.80	1-16	"
"	.90	1-8	"	"	1.60	3-32	"
3	1.25	1-32	1	"	1.50	1-8	"
"	1.10	3-64	"	"	1.50	"	1 1-4
"	1.00	1-16	"	"	1.50	"	1 1-2
"	1.00	3-32	"	6	2.70	"	1
"	1.00	1-8	"	"	3.50	3-16	1 1-2
4	1.45	3-64	"	7	3.80	1-8	1

We have on hand a quantity of similar Cutters, of sizes not in above list, which will be furnished at corresponding prices. If utmost limits of variation that can be allowed in diameter, thickness, and size of hole are given, we can often select such as may answer the requirements of parties who do not find such as they need in the list.

D 626. METAL SLITTING AND CIRCULAR SAW ARBORS.



Size, inches.... 3-8 1-2 5-8 3-4 1
Price, each..... \$2.50 \$2.50 \$2.50 \$2.50 \$2.50



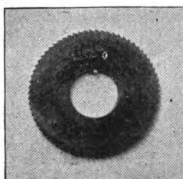
D 627. CIRCULAR SAW.

For Metal.

These Metal Saws are of very fine quality and temper, varying in thickness from No. 8 to 39, Brown & Sharpe wire gauge. These saws have 1-2 inch hole.

Diam. Gauge.	3-4	1	1 1-2	2	2 1-2	3	4	5	6	Thickness
No. 8....	\$0.38	\$0.39	\$0.42	\$0.46	\$0.52	\$0.60	\$0.86	\$1.30	\$1.94	.128
No. 9....	.33	.34	.37	.41	.47	.55	.81	1.25	1.89	.114
No. 10....	.28	.29	.32	.36	.42	.50	.76	1.20	1.84	.102
No. 11....	.25	.26	.29	.33	.39	.47	.73	1.17	1.81	.091
No. 12....	.22	.23	.26	.30	.36	.44	.70	1.14	1.78	.081
No. 13....	.19	.20	.23	.27	.33	.41	.67	1.11	1.75	.072
No. 14....	.17	.18	.21	.25	.31	.39	.65	1.09	1.73	.064
No. 15....	.15	.16	.19	.23	.29	.37	.63	1.07	1.71	.057
No. 16....	.13	.14	.17	.21	.27	.35	.61	1.05	1.69	.051
No. 17....	.12	.13	.16	.20	.26	.34	.60	1.04	1.68	.045
No. 18....	.11	.12	.15	.19	.25	.33	.59	1.03	1.67	.040
No. 19....	.10	.11	.14	.18	.24	.32	.58	1.02	1.66	.035

All Saws thinner than No. 19 gauge are same price as No. 19.



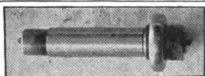
D 628.

SCREW SLOTTING CUTTERS.

These Cutters have a fine pitch of teeth especially adapted for the slotting of screw heads and similar work.

Cutters varying from the list are made to order.

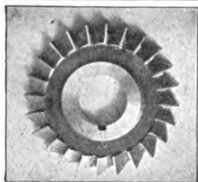
Diam. of Screw Head to be Slotted, inches.	Thickness of Cutter by Am. Standard Wire Gauge.	Price, Each.	Thickness of Cutter, inches, in Decimals.	Diameter of Cutter, inches.	Size Hole, inch.	Diam. of Screw Head to be Slotted, inches.	Thickness of Cutter by Am. Standard Wire Gauge.	Price, Each.	Thickness of Cutter, inches, in Decimals.	Diameter of Cutter, inches.	Size Hole, inch.
7-8	No. 8	\$0.60	.128	2 3-4	3-4 & 1	1-8	No. 27	\$0.15	.014	2 3-4	5-8
3-4	9	.50	.114	"	"	"	28	.15	.012	"	"
5-8	10	.40	.102	"	"	"	30	.15	.010	"	"
"	11	.35	.091	"	"	"	32	.15	.008	"	"
1-2	12	.30	.081	"	"	"	34	.15	.006	"	"
"	13	.25	.072	"	"	3-16	20	.15	.032	"	1-2
3-8	14	.20	.064	"	"	1-8	21	.15	.028	"	"
11-32	15	.15	.057	"	"	"	22	.15	.025	"	"
5-16	16	.15	.051	"	"	"	23	.15	.023	"	"
9-32	17	.15	.045	"	"	"	24	.15	.020	"	"
1-4	18	.15	.040	"	"	"	25	.15	.018	"	"
7-32	19	.15	.035	"	"	"	26	.15	.016	"	"
3-16	20	.15	.032	"	"	"	27	.15	.014	"	"
1-8	21	.15	.028	"	"	"	28	.15	.012	"	"
"	22	.15	.025	"	"	"	30	.15	.010	"	"
"	23	.15	.023	"	"	"	32	.16	.008	"	"
"	24	.15	.020	"	"	"	34	.15	.006	"	"
"	25	.15	.018	"	"	3-16	20	.15	.032	2 1-4	1-2, 5-8, 3-4
"	26	.15	.016	"	"	1-8	21	.15	.028	"	"
"	27	.15	.014	"	"	"	22	.15	.025	"	"
"	28	.15	.012	"	"	"	23	.15	.023	"	"
"	30	.15	.010	"	"	"	24	.15	.020	"	"
"	32	.15	.008	"	"	"	25	.15	.018	"	"
"	34	.15	.006	"	"	"	26	.15	.016	"	"
3-8	14	.20	.064	"	5-8	"	27	.15	.014	"	"
11-32	15	.15	.057	"	"	"	28	.15	.012	"	"
5-16	16	.15	.051	"	"	"	30	.15	.010	"	"
9-32	17	.15	.045	"	"	"	32	.15	.008	"	"
1-4	18	.15	.040	"	"	"	34	.15	.006	"	"
7-32	19	.15	.035	"	"	"	24	.12	.020	1 3-4	3-8, 1-2, 5-8
3-16	20	.15	.032	"	"	"	25	.12	.018	"	"
1-8	21	.15	.028	"	"	"	26	.12	.016	"	"
"	22	.15	.025	"	"	"	27	.12	.014	"	"
"	23	.15	.023	"	"	"	28	.12	.012	"	"
"	24	.15	.020	"	"	"	30	.12	.010	"	"
"	25	.15	.018	"	"	"	32	.12	.008	"	"
"	26	.15	.016	"	"	"	34	.12	.006	"	"



D 629.

SCREW SLOTTING CUTTER ARBORS.

3-8, 1-2, 5-8, 3-4 and 1 inch. Price, each.....\$2.50

**D 640. SIDE MILLING CUTTERS.**

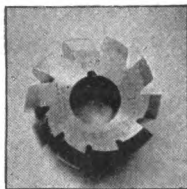
These Cutters are often used in pair for sizing nuts, bolt heads, etc., and are then called "Straddle Mills." They have teeth upon both sides and edges.

Cutters varying from the above list are made to order.

Diam. inches.	Price each.	Width of Face, in.	Hole, inches.	Diam. inches.	Price each.	Width of Face, in.	Hole, inches.
2	\$2.00	3-16	1-2	3	\$2.80	1-2	1
2	2.05	1-4	1-2	3 1-2	3.50	9-16	1
2	2.10	3-8	1-2	3 1-2	3.70	5-8	1
2	2.00	3-16	5-8	4	4.70	5-8	1
2	2.05	1-4	5-8	4	4.70	5-8	7-8
2	2.10	3-8	5-8	4	5.00	3-4	1
2 1-2	2.15	1-4	7-8	5	6.00	3-4	1
2 1-2	2.20	3-8	7-8	5	6.50	7-8	1
2 1-2	2.25	1-2	7-8	6	8.50	15-16	1 1-4
2 3-4	2.30	1-4	7-8	6	8.50	15-16	1 1-2
2 3-4	2.30	3-8	7-8	7	17.00	1 1-8	1 1-4
2 3-4	2.35	1-2	7-8	8	23.00	1 3-8	1 1-4
3	2.40	1-4	1	8	23.00	1 3-8	1 1-2
3	2.50	3-8	1				

D 641. SIDE MILLING CUTTERS WITH INSERTED TEETH.

We would recommend and are prepared to furnish Side Milling Cutters larger than 8 inches in diameter with inserted teeth. Prices on application.

D 642. SPECIAL CUTTERS FOR GROOVING TAPS.

We have added to our stock a style of Cutter adapted to grooving taps only. These Cutters do not make as deep a groove in proportion to the width as the tap and reamer cutters. They are not suitable for fluting reamers. See cut on right. These Cutters can be sharpened by grinding without changing their form. In ordering,

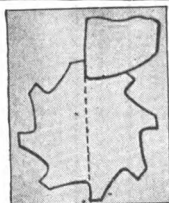
give number of cutter or diameter of tap, as by list below.



Gardner
Opening
Die
Head
Cuts
Exact
Threads.

Form of Tap.

Number of Cutter.	Price of each Cutter.	Diameter of Taps, inches.	Diameter of Cutter, in.	Hole in Cutter, in.
1	\$2.00	0 to 1-8	1 3-4	7-8
2	2.10	5-32 " 1-4	1 3-4	7-8
3	2.20	9-32 " 3-8	1 7-8	7-8
4	2.40	7-16 " 5-8	2	7-8
5	2.40	11-16 " 7-8	2 1-8	7-8
6	2.70	15-16 " 1 1-4	2 1-4	7-8
7	2.70	1 5-16 " 1 5-8	2 3-8	7-8
8	3.00	1 11-16 " 2	2 5-8	7-8

**D 643. CUTTERS FOR FLUTING REAMERS.**

The cut shows a form of cutter that makes a tooth that allows the chips to be removed more readily and has greater strength than the form made by the cutters for grooving taps and reamers.

In ordering, give number of cutter or diameter of reamer as by the following list.

These cutters can be sharpened by grinding without changing their form.

No. of Cutter.	Price.	Diameter of Reamer, inches.	No. of Teeth.	Hole in Cutter, in.
1	\$2.00	1-8 to 3-16	6	7-8
2	2.10	1-4 " 5-16	6	7-8
3	2.20	3-8 " 7-16	6	7-8
4	2.40	1-2 " 11-16	6 to 8	7-8
5	2.40	3-4 " 1	8	7-8
6	2.70	1 1-16 " 1 1-2	10	7-8
7	2.70	1 9-16 " 2 1-8	12	7-8
8	3.00	2 1-4 " 3	14	7-8

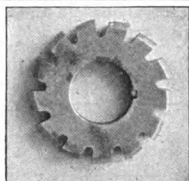
D 654. SPROCKET WHEEL CUTTERS.

We make and carry in stock a form of Sprocket Wheel Cutter for the ordinary 1 inch pitch chain. The Cutters for the smaller sized wheels are for cutting a curved form of tooth, to prevent the chain from mounting the sprocket, while the Cutters for the larger sized wheels make a straight sided tooth. Cutters of special forms, or made to cut two teeth at once, made to order.

No. Teeth, Sprocket.	Price.	Diameter of Cutter.	Hole in Cutter.	No. Teeth, Sprocket.	Price.	Diameter of Cutter.	Hole in Cutter.
6	\$6.00	2 3-4 in.	1 in.	11	\$6.00	2 3-4 in.	1 in.
7	6.00	"	"	12	6.00	"	"
8	6.00	"	"	14 to 16	6.00	"	"
9	6.00	"	"	17 to 20	6.00	"	"
10	6.00	"	"				

D 655. CUTTERS FOR SAWING BICYCLE CHAIN LINKS.

These Cutters are especially adapted to run in gangs for sawing bicycle chain links. Like metal slitting saws they are ground on the sides for clearance. They have fine teeth, are 3 inches in diameter, .092 inches thick and have a 1 inch hole. Price, each \$1.00



D 656. CUTTERS FOR MAKING TWIST DRILLS.

These Cutters can be sharpened by grinding without changing their form.

In ordering, give number of Cutter or diameter of drill as by list below.

Number of Cutter.	Price of each Cutter.	Diameter of Drill.	Diameter of Circle made by Cutter.	Diameter of Cutter.	Hole in Cutter.
1	\$1.50	1-16 inch.	.06 inch.	1 3-4 inch.	7-8 in.
2	1.70	1-8 "	.08 "	1 3-4 "	"
3	1.90	3-16 "	.11 "	1 3-4 "	"
4	2.10	1-4 "	.15 "	1 3-4 "	"
5	2.30	5-16 "	.19 "	2 "	"
6	2.40	3-8 "	.23 "	2 "	"
7	2.60	7-16 "	.27 "	2 "	"
8	2.80	1-2 "	.31 "	2 "	"
9	3.00	9-16 "	.35 "	2 1-8 "	"
10	3.20	5-8 "	.39 "	2 1-8 "	"
11	3.40	11-16 "	.44 "	2 1-8 "	"
12	3.60	3-4 "	.50 "	2 1-4 "	"
13	3.80	13-16 "	.56 "	2 1-4 "	"
14	4.00	7-8 "	.62 "	2 1-2 "	"
15	4.20	15-16 "	.70 "	2 1-2 "	"
16	4.50	1 "	.77 "	2 3-4 "	"
17	5.00	1 1-8 "	.85 "	2 3-4 "	"



EMERY WHEEL AND ARBOR.

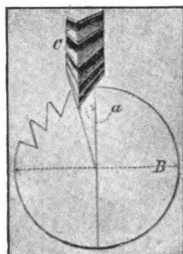


D 657.

D 658.

Emery Wheel (diameter of hole, 3-4 inch) for grinding cutters \$0.75
 Arbor for same 2.50

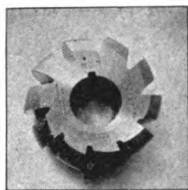
Keep the Cutters sharp.



D 659. CUTTERS FOR SPIRAL MILLS.

We keep in stock a form of cutter especially adapted to the cutting of spiral mills. It is 40 degrees angle on one side and 12 degrees on the other and is a right hand cutter. The cut illustrates a cutter at work, in the position required in cutting the teeth of a spiral cutter.

Diam., In.	Price.	Thickness, In.	Hole, In.
2 1-2	\$2.70	1-2	7-8
2 3-4	3.00	"	1
3	3.25	"	1 1-4



CUTTERS FOR GROOVING TAPS AND REAMERS.

D 670.

No. 1 Cutter is suitable for grooving taps 1-8 inch or less diameter; No. 2, for taps larger than 1-8 inch and up to 1-4 inch diameter, etc. See cut, D 671.

These Cutters are also adapted for fluting reamers, for which purpose it is necessary only to cut one or more grooves of a less depth in order to flute unevenly. See cut, D 672.

PRICES OF CUTTERS FOR GROOVING TAPS.

No. of Cutter.	Price, Each.	Diameter of Tap, Inches.	No. Teeth in Tap.	Diameter of Cutter, In.	Hole in Cutter, In.
1	\$2.00	0 to 1-8	4	1 3-4	7-8
2	2.10	5-32 " 1-4	"	"	"
3	2.20	9-32 " 3-8	"	1 7-8	"
4	2.40	7-16 " 5-8	"	2	"
5	2.40	11-16 " 7-8	"	2 1-8	"
6	2.70	15-16 " 1 1-4	"	2 1-4	"
7	2.70	1 5-16 " 1 5-8	"	2 3-8	"
8	3.00	1 11-16 " 2	"	2 5-8	"

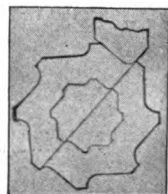
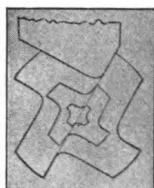
PRICES OF CUTTERS FOR GROOVING REAMERS.

No. of Cutter.	Price, Each.	Diam. of Reamer, Inches.	No. Teeth in Reamer.	Diameter of Cutter, In.	Hole in Cutter, In.
1	\$2.00	1-8 to 1-4	6	1 3-4	7-8
2	2.10	9-32 " 3-8	"	"	"
3	2.20	13-32 " 1-2	"	1 7-8	"
4	2.40	17-32 " 3-4	"	2	"
4	2.40	25-32 " 1 1-8	8	"	"
5	2.40	1 5-32 " 1 3-8	"	2 1-8	"
5	2.40	1 13-32 " 1 3-4	10	"	"
6	2.70	1 25-32 " 2	"	2 1-4	"

These cutters can be sharpened by grinding without changing their form.

In ordering, give number of cutter, or diameter and number of teeth of tap or reamer as by above lists.

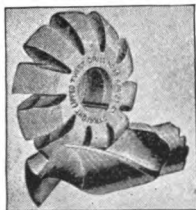
✓ Shaped Cutters of any angle made to order.



Malleable
Thumb
Nuts
Carried in
Stock.

D 671. Form of Tap.

D 672. Form of Reamer.



D 673.

CUTTERS FOR MAKING STRAIGHT LIPPED TWIST DRILLS.

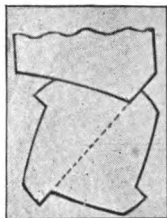
These Cutters can be sharpened by grinding without changing their form.

In ordering, give number of cutter or diameter of drill, as by list below.

No. Cutt'r	Price of Cutter.	Diam. of Drill, Inches.	Diam. Cutter, Inches.	Hole, Inch.	No. Cutt'r	Price of Cutter.	Diam. of Drill, Inches.	Diam. Cutter, Inches.	Hole, Inch.
1	\$1.50	1-16	1 3-4	7-8	12	\$3.60	3-4	2 1-4	7-8
2	1.70	1-8	"	"	13	3.80	13-16	"	"
3	1.90	3-16	"	"	14	4.00	7-8	2 1-2	"
4	2.10	1-4	"	"	15	4.20	15-16	"	"
5	2.30	5-16	2	"	16	4.50	1	2 3-4	"
6	2.40	3-8	"	"	17	5.00	1 1-8	"	"
7	2.60	7-16	"	"	18	5.50	1 1-4	3	"
8	2.80	1-2	"	"	19	6.25	1 1-2	3 1-2	1
6	3.00	9-16	2 1-8	"	20	7.00	1 3-4	"	"
10	3.20	5-8	"	"	21	7.75	2	3 3-4	"
11	3.40	11-16	"	"					

D 684. CUTTERS FOR MAKING FOUR-LIPPED TWIST DRILLS.

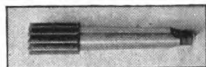
The cut shows a form of tooth for Four-Lipped Twist Drills that are used in screw and chucking machines for roughing out holes previous to reaming. These drills are made, when possible, as shell drills to be used on an arbor and should have a spiral or "twist" of fifteen degrees.



In ordering give number of cutter or size of drill as by the following list.

These cutters can be sharpened by grinding without changing their form.

No. of Cutter.	Price.	Size Drill, Inches.	Size of Cutter, In.	Hole in Cutter, In.
1	\$6.00	to 1 1-2	2 3-4	1
2	7.00	1 1-2 to 3	3	"



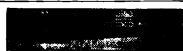
Left Hand Mill.

D 685. END MILLS.

In ordering state whether right or left hand mills are wanted.

Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper	Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper
1-4	\$1.00	13-16	2 7-16	4	13-16	\$2.00	1 5-8	6 15-16	9
"	1.15	"	3	5	7-8	2.10	1 3-4	5 7-8	7
5-16	1.00	7-8	2 7-16	4	"	2.25	"	7 1-16	9
"	1.15	"	3 1-16	5	15-16	2.10	"	5 7-8	7
3-8	1.10	"	2 7-16	4	"	2.25	"	7 1-16	9
"	1.20	"	3 1-16	5	1	2.15	1 7-8	6	7
7-16	1.10	15-16	2 1-2	4	"	2.30	"	7 3-16	9
"	1.25	"	3 1-8	5	1 1-16	2.15	"	6	7
1-2	1.30	1	"	5	"	2.35	"	7 3-16	9
"	1.45	1 1-8	5 1-8	7	1 1-8	2.25	2	6 1-4	7
9-16	1.35	1 1-16	3 1-8	5	"	2.40	"	7 1-4	9
"	1.50	1 1-4	5 1-4	7	1 3-16	2.25	"	6 1-4	7
5-8	1.45	"	3 5-16	5	"	2.50	"	7 1-4	9
"	1.70	1 1-2	5 3-8	7	1 1-4	2.25	"	6 1-4	7
11-16	1.75	"	"	7	"	2.55	"	7 1-4	9
"	1.90	"	6 13-16	9	1 5-16	2.75	2 1-8	7 3-8	"
3-4	1.80	1 5-8	5 1-2	7	1 3-8	2.75	"	"	"
"	1.95	"	6 15-16	9	1 7-16	3.00	2 1-4	7 1-2	"
13-16	1.90	"	5 3-4	7	1 1-2	3.00	"	"	"

No. 4 Taper fits A and J Collets. No. 5 Taper fits C, D and K Collets. No. 7 Taper fits B and E Collets. No. 9 Taper fits F, G, H, I, S and T Collets. BROWN & SHARPE MILLING MACHINES.



Left Hand Mill.

D 686. END MILLS WITH CENTER CUT.

In ordering state whether right or left hand mills are wanted.

These END MILLS are useful where it is desired to cut into the work with the end of the mill, and then move along as in cams, grooves, etc., as the teeth are sharp on the inside, and thus cut a path out from the first entering point. They are also useful in taking heavy cuts, especially in cast iron.

Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper	Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper
1-2	\$1.50	1	3 1-8	5	15-16	\$2.80	1 3-4	7 1-16	9
"	1.80	1 1-8	5 1-8	7	1	2.70	1 7-8	6	7
9-16	1.70	1	3 1-8	5	"	2.85	"	7 3-16	9
"	1.85	1 1-4	5 1-4	7	1 1-16	2.70	"	6	7
5-8	1.80	"	3 5-16	5	"	2.95	"	7 3-16	9
"	2.10	1 1-2	5 3-8	7	1 1-8	2.80	2	6 1-4	7
11-16	2.15	"	"	7	"	3.00	"	7 1-4	9
"	2.35	"	6 13-16	9	1 3-16	2.80	"	6 1-4	7
3-4	2.25	1 5-8	5 1-2	7	"	3.10	"	7 1-4	9
"	2.45	"	6 15-16	9	1 1-4	2.80	"	6 1-4	7
13-16	2.35	"	5 3-4	7	"	3.20	"	7 1-4	9
"	2.50	"	6 15-16	9	1 5-16	3.45	2 1-8	7 3-8	"
7-8	2.60	1 3-4	5 7-8	7	1 3-8	3.45	"	"	"
"	2.80	"	7 1-16	9	1 7-16	3.75	2 1-4	7 1-2	"
15-16	2.60	"	5 7-8	7	1 1-2	3.75	"	"	"

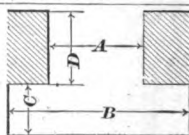
No. 4 Taper fits A and J Collets. No. 5 Taper fits C, D and K Collets. No. 7 Taper fits B and E Collets. No. 9 Taper fits G, H, I, S and T Collets. BROWN & SHARPE MILLING MACHINES.

D 697. STANDARD T SLOT CUTTERS.

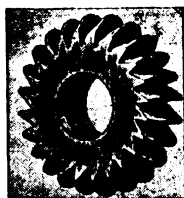


Left Hand Cutter.

The Cutters are made 1-32 inch larger in diameter than the figures given, to allow for sharpening. Other sizes and right h'd cutters made to order.



No. of Cutter.	Price Each.	Width of Slot A. Inches.	Diam. of Neck of Cutter. Inches.	Width of Slot B. Inches.	Depth, C. Inches.	Extreme Limit, D. Inches.	No. of Taper.
4	\$1.50	1-4	7-32	1-2	5-32	1-4	4
7	1.60	"	"	"	"	"	5
10	1.80	5-16	9-32	5-8	"	5-16	5
13	2.10	"	"	"	"	"	7
16	2.00	3-8	11-32	11-16	7-32	3-8	5
19	2.20	"	"	"	"	"	7
22	2.35	7-16	3-8	13-16	"	7-16	7
25	2.50	"	"	"	"	"	9
28	2.60	1-2	7-16	15-16	9-32	1-2	7
31	2.80	"	"	"	"	"	9
34	3.10	5-8	17-32	13-16	13-32	5-8	"
37	3.45	3-4	21-32	15-16	17-32	15-16	"
40	3.75	7-8	25-32	15-8	11-16	1 1-16	"
43	4.00	1	29-32	1 7-8	13-16	1 3-16	"



D 698.

CONVEX AND CONCAVE MILLING CUTTERS.

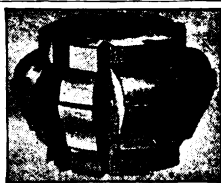
Ground to a True Arc.

Convex and Concave Cutters furnished to any arc or to a true half circle, as desired. These Cutters can be sharpened by grinding without changing their form.



D 699.

Diam. Circle Inch.	Convex Cutter. Price.	Conc'v'e Cutter. Price.	Diam. Cutter. Inch.	Size Hole. Inch.	Diam. Circle Inch.	Convex Cutter. Price.	Conc'v'e Cutter. Price.	Diam. Cutter. Inch.	Size Hole. Inch.
1-8	\$2.00	\$2.40	2	7-8	7-8	\$4.80	\$5.75	3 1-4	7-8
1-4	2.50	3.00	"	"	1	5.25	6.30	"	1
3-8	3.10	3.70	2 1-4	"	1 1-8	6.75	6.90	3 1-2	"
1-2	3.60	4.30	"	"	1 1-4	6.25	7.50	"	"
5-8	4.00	4.80	2 3-4	"	1 3-8	7.00	8.40	3 3-4	"
3-4	4.40	5.25	"	"	1 1-2	7.75	9.30	"	"



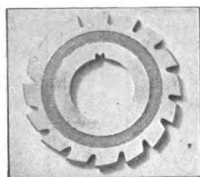
D 700.

LARGE FORMED MILLING CUTTERS.

Milling Cutters of irregular form are used in gangs limited in size only by the capacity and power of the Milling Machines.

Single Cutters, 7 inches diameter or 6 inches long, are not uncommonly made in one piece.

IMPROVED STOCKING CUTTERS FOR INVOLUTE GEARS.



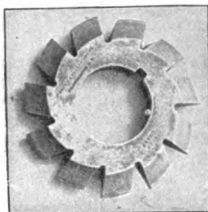
D 701.

Diametral Pitch.	Price of Cutter.	Diameter of Cutter, In.	Hole in Cutter, In.
2	\$7.50	5	1 1-4
2 1-4	6.75	4 1-2	"
2 1-2	6.00	4 1-4	"
2 3-4	5.40	4	"Try our
3	4.20	3 7-8	"Brush
3 1-4	3.90	3 3-4	"Copper for
3 1-2	3.75	3 5-8	"Electrical
3 3-4	3.60	3 1-2	"Work.
4	3.30	3 3-8	"
4 1-2	3.00	3 1-4	"
5	2.70	3 1-8	1 1-16
5 1-2	2.50	2 7-8	"
6	2.35	2 3-4	"
7	2.20	2 5-8	"
8	2.05	2 1-2	"

D 712.

PATENT EPICYCLOIDAL CUTTERS**For the Teeth of Gear Wheels,**

Which can be sharpened by grinding without changing their form.



We furnish Cutters of Epicycloidal form, which are sharpened upon the face the same as the Involute Cutters. As gears of this form of teeth to run well must be cut accurately to the proper depth, that the pitch lines may coincide, we make the Cutters with a shoulder (see cut), which determines the exact depth that the tooth should be cut, so that care taken in sizing the blanks obviates the necessity of any measurements in cutting the teeth. The Cutters are made for either diametral or circular pitches, and the same rules apply in finding the diameters of blanks as in our system of Involute

teeth; i. e., 2 pitches added to the diameter at pitch line. See formulas, back of book

These Cutters will cut gears which are interchangeable.

The white line on edge of the two left hand upper teeth of cut represents a center line on the cutter teeth, which may be a convenience in setting the cutter central. The Cutters are marked with letters from A to X, by which they may be ordered. See following table for dimensions of Cutters.

All gears of same pitch cut with these cutters are interchangeable.

Diametral Pitch.	Price of Cutter.	Diam. Cutter.	Size Hole in Cutter.	Diametral Pitch.	Price of Cutter.	Diam. Cutter.	Size Hole in Cutter.
*2	\$15.50	5 inch.	1 1-4 in.	6	\$4.65	2 3-4	1 1-16 in.
*2 1-4	14.00	4 1-2	"	*7	4.40	2 9-16	"
*2 1-2	13.00	4 1-4	"	8	3.90	2 1-2	"
*2 3-4	11.75	4	"	*9	3.65	2 3-8	"
3	10.75	3 13-16	"	10	3.40	2 1-8	7-8
*3 1-2	9.75	3 9-16	"	*12	3.20	2	"
4	6.60	3 3-8	"	*14	3.00	2	"
5	5.65	3 1-16	"	*16	2.80	1 15-16	"

Cutters marked * are not kept in stock but are made to order.

CUTTERS ARE MARKED WITH LETTERS — 24 CUTTERS IN EACH SET.

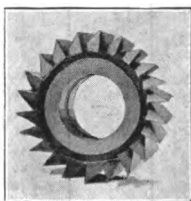
Cutter A cuts 12 teeth.	Cutter I cuts 20 teeth.	Cutter Q cuts 43 to 49 teeth.
" B " 13 "	" J " 21 to 22 "	" R " 50 to 59 "
" C " 14 "	" K " 23 to 24 "	" S " 60 to 74 "
" D " 15 "	" L " 25 to 26 "	" T " 75 to 99 "
" E " 16 "	" M " 27 to 29 "	" U " 100 to 149 "
" F " 17 "	" N " 30 to 33 "	" V " 150 to 249 "
" G " 18 "	" O " 34 to 37 "	" W " 250 or more.
" H " 19 "	" P " 38 to 42 "	" X " Rack.

In ordering give the Letter on Cutter and the Pitch required.

For Useful Tables, see Back of Book.

D 713. ANGULAR CUTTERS.

We keep in stock Angular Cutters of 50 deg., 60 deg., 70 deg. and 80 deg. angle, both right and left hand, suitable for cutting the teeth of cutters and mills.



Right Hand Cutter.

Diameter. Inches.	Price Each.	Thickness. Inches.	Hole. Inches.
2 1-2	\$2.70	1-2	7-8
2 3-4	3.00	"	1
3	3.25	"	1 1-4

D 714. ANGULAR CUTTERS WITH THREADED HOLES.

These cutters have an angle of 60 deg., and are made both right and left hand.

Diameter.	Price Each.	Thickness.	Hole.	Thread.
1 1-4 inch.	\$2.25	7-16 inch.	3-8 inch.	20, L.
1 5-8 "	2.50	9-16 "	1-2 "	16, L.

D 715. Right Hand Cutter. D 716.

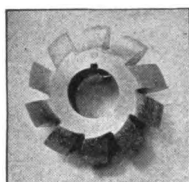
**ANGULAR CUTTERS
AND CUTTERS FOR SPIRAL
MILLS**

That can be sharpened by grinding, without changing their form, are made to order.



PATENT CUTTERS FOR THE TEETH OF GEAR WHEELS

Which can be Sharpened by Grinding without Changing their Form.



D 727.

The PATENT CUTTERS for the teeth of Gear Wheels, from their peculiar construction, can be sharpened when dull by grinding the face of the teeth. This operation can be repeated without altering the form of the tooth which the Cutter makes, thereby rendering them many times more valuable than Cutters of ordinary form. Having a complete stock of all sizes from 3 to 48 pitch on hand, orders can be filled promptly.

The larger sizes and Cutters for worm wheels, can be made to order at short notice. Orders should be given by annexed tables, stating the *Number of Cutter* and the *Diametral Pitch* required. By *Diametral Pitch* is meant the number of teeth to the inch in diameter on pitch circle of any wheel. In ordering cutters for worm wheels, give the *number of teeth in wheel, the diameter of worm and number of threads to the inch.*

DIRECTIONS FOR USING THE CUTTERS.—The Cutters should be kept perfectly sharp by grinding the face of the teeth on the side of a solid emery or vulcanite wheel, which has its edge beveled on one side so as to reach to the bottom of the teeth. This wheel should be put on an arbor with a shoulder and nut, so that the flat side will run true, and at a velocity of from 2,000 to 3,000 revolutions per minute. If used in a common hand lathe the top of the rest should be made square or vertical to the face of the wheel, or what is better, use a small platform in the place of the rest. Then by laying the Cutter on the rest or platform, the face of the teeth can be ground square, which is very important. The Cutters should not be crowded too hard, especially when cutting through at the end of the tooth. *The depth of the space made by these Cutters affords ample clearance, as it exceeds the working depth of the tooth by an amount equal to one-tenth of the thickness of the tooth on the pitch line.*

PAT. INVOLUTE CUTTERS FOR TEETH OF GEAR WHEELS.

All Gears of same Pitch cut with these Cutters are interchangeable.

Diametral Pitch.	Each Cutter.	Diam. Cutter.	Size Hole in Cutter.	Diametral Pitch.	Each Cutter.	Diam. Cutter.	Size Hole in Cutter.
*2	\$12.50	5 inch.	1 1-4 in.	16	\$2.45	1 15-16	7-8 in.
*2 1-4	11.25	4 1-2	"	18	2.35	"	"
*2 1-2	10.00	4 1-4	"	20	2.30	1 7-8	"
*2 3-4	9.00	4	"	22	2.20	1 13-16	"
3	7.00	3 13-16	"	24	2.10	1 3-4	"
*3 1-4	6.50	"	"	26	1.95	"	"
*3 1-2	6.25	3 9-16	"	28	1.80	"	"
*3 3-4	6.00	"	"	30	1.80	"	"
4	5.50	3 3-8	"	32	1.80	"	"
*4 1-2	5.00	3 1-4	"	36	1.80	"	"Special
5	4.50	3 1-16	"	*38	1.80	"	"Drills,
*5 1-2	4.20	2 7-8	"	40	1.80	"	"Made to
6	3.90	2 3-4	1 1-6	*44	1.80	"	"Order.
7	3.60	2 9-16	"	48	1.80	"	"
8	3.40	2 1-2	"	*50	1.80	"	"
9	3.20	2 3-8	"	*56	1.80	"	"
10	3.00	2 1-8	7-8	*60	1.80	"	"
11	2.75	2 1-16	"	*64	1.80	"	"
12	2.65	2	"	*70	1.80	"	"
*13	2.60	2	"	*80	1.80	"	"
14	2.55	2	"	*120	1.80	"	"
*15	2.50	2	"				

Cutters marked * are not kept in stock, but are made to order.

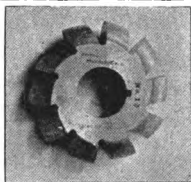
SPECIAL GEAR CUTTERS.

Worm Wheel Cutters and Cutters of special dimensions are made to order at special prices. Spur and Bevel Gear Cutters, shown in lists, when ordered with special size hole, are made to order at an advance of fifty cents each on list price. If six or more of one pitch are ordered with special size hole, the list price is charged.

WE MAKE TO ORDER

Large Milling Cutters and Face Mills with Inserted Teeth.

Prices and further information given on application.



D 738.

PATENT INVOLUTE CUTTERS

For Teeth of Gear Wheels.

Extra large diameter, for use on No. 5 Automatic Gear Cutting Machine.

Cutters marked * are not kept in stock, but are made to order.

Diametral Pitch, In.	Price.	Diam. of Cutter, In.	Hole, Inches.	Diametral Pitch, In.	Price.	Diam. of Cutter, In.	Hole, Inches.
3	\$8.00	4 3-4	1 1-4	5	\$5.25	4	1 1-4
*3 1-4	7.75	4 1-2	"	*5 1-2	5.00	"	"
*3 1-2	7.25	"	"	6	4.75	3 3-4	"
*3 3-4	6.75	4 1-4	"	*7	4.50	3 5-8	"
4	6.25	"	"	8	4.25	3 1-2	"
*4 1-2	5.75	"	"	*9	4.00	"	"

D 739.

PATENT INVOLUTE CUTTERS

For Teeth of Gear Wheels.

Eight Cutters are made for each pitch, as follows:

No. 1 cuts wheels from 135 teeth to a rack.	No. 5 cuts wheels from 21 to 25 teeth.
" 2 " " " 55 to 134 teeth.	" 6 " " " 17 " 20 "
" 3 " " " 35 " 54 "	" 7 " " " 14 " 16 "
" 4 " " " 26 " 34 "	" 8 " " " 12 " 13 "

In ordering, give the *No. of Cutter and Diametral Pitch* required. A stock of Cutters, from 3 to 48 pitch, as per above list, is kept on hand. Cutters in stock can be ordered by telegraph. Form of telegram: "*Send one Cutter, No. five, eight pitch.*"

**Special
Taps
Made to
Order.**

CENTER LINE ON GEAR CUTTERS.

We would call attention to the center line on gear cutters, which may be convenient in setting cutters central with the work spindle.

D 740.

PATENT METRIC INVOLUTE CUTTERS

For Teeth of Gear Wheels.

All gears of same pitch cut with these cutters are interchangeable.

We are prepared to furnish, at short notice, cutters for cutting the teeth of gear wheels of metrical circular pitch.

Circular Pitch	Price.	Hole.	Circular Pitch	Price.	Hole.
1 m. m.	\$1.80	22 m. m.	10 m. m.	\$3.40	27 m. m.
2	1.80	"	12	3.75	"
3	1.95	"	16	4.50	32
4	2.30	"	20	5.50	"
5	2.45	"	24	6.50	"
6	2.60	"	32	10.00	"
8	3.00	"	40	12.50	"

WORM WHEEL CUTTERS.

Cutters of any given diameter and pitch for cutting worm wheels are made to order. In ordering cutters for worm wheels, give the *number of teeth in wheel, the diameter of worm and number of threads to the inch.*

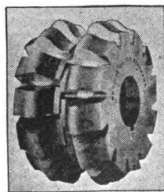
CUTTERS FOR SPROCKET WHEELS.

D 741.
Single Cutter.

Cutters for Sprocket Wheels with any number of teeth of the ordinary straight side form, can be furnished very promptly.

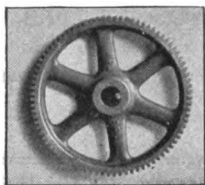
Tools can be made for wheels with teeth of other shapes, and we also can make Cutters for finishing two teeth at a time.

All Cutters for this work can be sharpened by grinding without changing their form, so that wheels made by them are always interchangeable.



D 742.
Double Cutters.

To obtain the best results all the teeth in a Sprocket Wheel should be exactly uniform, for by using a well made chain with wheels that have uniform teeth the friction is reduced to a minimum. Wheels finished with our cutters have uniform teeth.

D 753. BROWN & SHARPE MFG. CO.'S STANDARD GEARS.

An experience of many years in making and cutting Gear Wheels to order, the dimensions of which, in those of the same pitch, have been so varied in width and thickness of rims, arms, etc., made us realize the great advantages which would result from a uniform standard of sizes. We have therefore made iron patterns uniform in style and are now prepared, by the aid of automatic machinery, to furnish the sizes of gears in the following pages, singly, or in quantities to suit, at reasonable prices.

COMBINATION GEARS.

We would call to the attention of our customers that these Gears are now furnished with either involute or epicycloidal teeth, and not only with epicycloidal teeth as heretofore. In ordering, please specify which style is preferred. Unless it is specified on the order which style is desired, we shall ship that style that we have in stock at the time the order is received, and thus avoid any delays in delivery of the goods.

D 754. BROWN & SHARPE MFG. CO.'S CUT GEARS.

Helmet Oil
Lubricates
Anything.

Involute and Epicycloidal Teeth. Combination Gears.

In the following pages will be found tables giving general dimensions of what we have termed **Combination Gears**, from their being especially arranged to admit of a great variety of combinations for the transmission of power, as in the case of back gears for lathes or similar machines.

They are all uniform in their proportions, which were obtained from a carefully studied formula, the dimensions of arms and widths of faces being proportioned to the pitch, and symmetrical throughout the system.

The holes in the gears are of standard size, the ends of the hubs faced, and the rims finished, with teeth accurately cut of involute or epicycloidal form.

Unless a manufacturer requires a sufficient number of gears to keep gear-cutting machinery in constant operation, it is cheaper, better and more convenient for him to buy Standard Gears, than to make, store and repair patterns, invest in the necessary machinery, cutters, etc., give room to frequently idle tools, and keep the class of help requisite to do the work.

From the large number of gears with cut teeth which are kept in stock, machinists can supply themselves promptly and at small cost.

D 755. 4 PITCH.—INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, $2\frac{1}{4}$ in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
15	\$2.60	4 1-4	1 1-2	2 1-2	2 1-2	Plain	60	\$7.67	15 1-2	1 3-4	2 5-8	3 1-2	Arms
16	2.74	4 1-2	"	"	"	"	64	8.15	16 1-2	2	3	4	"
20	3.19	5 1-2	"	"	"	"	68	8.63	17 1-2	"	"	"	"
24	3.63	6 1-2	"	"	"	Web	72	9.11	18 1-2	"	"	"	"
28	4.08	7 1-2	"	"	"	"	76	9.59	19 1-2	"	"	"	"
32	4.52	8 1-2	1 3-4	2 5-8	2 7-8	"	80	10.07	20 1-2	"	"	"	"
36	4.97	9 1-2	"	"	"	"	88	10.56	22 1-2	"	"	"	"
40	5.41	10 1-2	"	"	"	Arms	104	15.00	26 1-2	2 1-4	"	4 1-2	"
44	5.85	11 1-2	"	"	"	"	112	17.00	28 1-2	"	"	"	"
48	6.29	12 1-2	"	"	3 1-4	"	120	17.75	30 1-2	"	3 3-8	"	"
52	6.73	13 1-2	"	"	"	"	132	19.00	33 1-2	"	"	"	"
56	7.17	14 1-2	"	"	3 1-2	"							

D 756. 5 PITCH.—INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, $1\frac{1}{2}$ in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
15	\$2.20	3 2-5	1 5-16	2 3-16	2 1-4	Plain	46	\$4.65	9 3-5	1 1-2	2 1-4	2 1-2	Arms
20	2.58	4 2-5	"	"	"	"	50	4.85	10 2-5	"	"	"	"
25	2.98	5 2-5	"	"	"	Web	54	5.20	11 1-5	"	"	"	"
30	3.02	5 3-5	"	"	"	"	58	5.65	12	"	"	"	"
36	3.32	6 2-5	"	"	"	"	60	5.86	12 2-5	"	"	3	"
34	3.58	7 1-5	"	"	"	"	65	6.25	13 2-5	"	"	"	"
35	3.77	7 2-5	"	"	"	"	70	6.63	14 2-5	1 3-4	2 5-8	3 1-4	"
38	3.83	8	"	"	"	"	75	7.03	15 2-5	"	"	3 1-2	"
40	3.85	8 2-5	1 1-2	2 1-4	2 1-2	Arms	80	7.44	16 2-5	"	"	"	"
42	4.21	8 4-5	"	"	"	"	85	7.89	17 2-5	"	"	"	"
45	4.56	9 2-5	"	"	"	"	90	8.32	18 2-5	"	"	"	"

D 767. 6 PITCH. — INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 1.9-16 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
15	\$1.88	2 5-6	1 3-16	1 3-4	2	Plain	52	\$3.96	9	1 5-16	2	2 1-4	Arms
18	2.00	3 2-6	"	"	"	"	56	4.26	9 4-6	"	"	"	"
24	2.44	4 2-6	"	"	"	"	60	4.48	10 2-6	"	"	"	"
27	2.61	4 5-6	"	"	"	Web	64	4.74	11	"	"	2 5-8	"
28	2.67	5	"	"	"	"	68	4.95	11 4-6	"	"	"	"
30	2.78	5 2-6	"	"	"	"	72	5.26	12 2-6	"	"	"	"
32	2.89	5 4-6	"	"	"	"	75	5.48	12 5-6	"	"	"	"
33	2.96	5 5-6	"	"	"	"	78	5.70	13 2-6	1 1-2	2 1-4	3	"
36	3.15	6 2-6	1 5-16	2	2 1-4	"	81	5.89	13 5-6	"	"	"	"
39	3.33	6 5-6	"	"	"	"	84	6.07	14 2-6	"	"	"	"
40	3.38	7	"	"	"	"	87	6.26	14 5-6	"	"	2 1-2	"
42	3.52	7 2-6	"	"	"	"	90	6.44	15 2-6	"	"	3	"
44	3.60	7 4-6	"	"	"	"	93	6.63	15 5-6	"	"	2 1-2	"
45	3.68	7 5-6	"	"	"	Arms	96	6.81	16 2-6	"	"	3	"
48	3.84	8 2-6	"	"	"	"							

D 768. 7 PITCH. — INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 1 3/4 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
21	\$1.98	3 2-7	1 1-16	1 5-8	1 7-8	Plain	62	\$3.89	9 1-7	1 3-16	1 7-8	2	Arms
28	2.29	4 2-7	"	"	"	Web	63	3.94	9 2-7	"	"	"	"
34	2.56	5 1-7	"	"	"	"	66	4.09	9 5-7	"	"	"	"
35	2.61	5 2-7	"	"	"	"	70	4.25	10 2-7	"	"	"	"
38	2.81	5 5-7	"	"	"	"	74	4.43	10 6-7	1 3-8	2 1-8	2 5-16	"
42	2.96	6 2-7	1 3-16	1 7-8	2	"	77	4.60	11 2-7	"	"	"	"
46	3.12	6 6-7	"	"	"	"	78	4.65	11 3-7	"	"	"	"
49	3.31	7 2-7	"	"	"	Arms	82	4.85	12	"	"	"	"
50	3.38	7 3-7	"	"	"	"	84	4.95	12 2-7	"	"	"	"
54	3.56	8	"	"	"	"	91	5.30	13 2-7	"	"	"	"
58	3.74	8 4-7	"	"	"	"	98	5.65	14 2-7	"	"	"	"

D 769. 8 PITCH. — INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 1 1/4 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
22	\$1.76	2 6-8	1	1 1-2	1 3-4	Plain	60	\$3.26	7 6-8	1 1-8	1 3-4	1 1/8	Arms
20	1.83	3	"	"	"	"	64	3.38	8 2-8	"	"	"	"
24	1.89	3 2-8	"	"	"	"	66	3.46	8 4-8	"	"	"	"
26	1.99	3 4-8	"	"	"	"	68	3.52	8 6-8	"	"	"	"
28	2.05	3 6-8	"	"	"	"	70	3.63	9	"	"	"	"
30	2.15	4	"	"	"	Web	72	3.69	9 2-8	"	"	"	"
32	2.21	4 2-8	"	"	"	"	74	3.79	9 4-8	"	"	"	"
34	2.31	4 4-8	1 1-8	1 3-4	1 5/8	"	76	3.85	9 6-8	1 1-4	1 7-8	2 1-8	"
36	2.38	4 6-8	"	"	"	"	78	3.96	10	"	"	"	"
38	2.45	5	"	"	"	"	80	4.02	10 2-8	"	"	"	"
40	2.53	5 2-8	"	"	"	"	82	4.09	10 4-8	"	"	"	"
44	2.68	5 6-8	"	"	"	"	84	4.18	10 6-8	"	"	"	"
50	2.90	6 4-8	"	"	"	"	86	4.25	11	"	"	"	"
52	2.98	6 6-8	"	"	"	"	88	4.31	11 2-8	"	"	"	"
56	3.14	7 2-8	"	"	"	Arms	160	7.50	20 2-8	"	"	2 1-2	"

D 770. 9 PITCH. — INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 1 1/2 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
21	\$1.68	2 5-9	1 5-16	1 1-2	1 1/8	Plain	63	\$2.97	7 2-9	1 1-16	1 5-8	1 7-8	Arms
24	1.76	2 8-9	"	"	"	"	66	3.06	7 5-9	"	"	"	"
27	1.87	3 2-9	"	"	"	"	69	3.18	7 8-9	1 3-16	1 3-4	2	"
30	1.95	3 5-9	"	"	"	"	70	3.23	8	"	"	"	"
33	2.05	3 8-9	"	"	"	Web	72	3.26	8 2-9	"	"	"	"
36	2.13	4 2-9	1 1-16	1 5-8	1 7-8	"	74	3.30	8 4-9	"	"	"	"
38	2.21	4 4-9	"	"	"	"	75	3.34	8 5-9	"	"	"	"
39	2.26	4 5-9	"	"	"	"	78	3.45	8 8-9	"	"	"	"
42	2.34	4 8-9	"	"	"	"	81	3.53	9 2-9	"	"	"	"
46	2.50	5 3-9	"	"	"	"	82	3.58	9 3-9	"	"	"	"
50	2.61	5 7-9	"	"	"	"	84	3.62	9 5-9	"	"	"	"
54	2.70	6 2-9	"	"	"	"	86	3.70	9 7-9	"	"	"	"
58	2.82	6 6-9	"	"	"	"	90	3.83	10 2-9	"	"	"	"
62	2.93	7 1-9	"	"	"	Arms	94	4.00	10 6-9	"	"	"	"

D 781. 10 PITCH.—INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 11-16 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
20	\$1.53	2 2-10	15-16	1 3-8	1 1/4	Plain	70	\$2.80	7 2-10	1	1 1-2	1 3-4	Arms
25	1.67	2 7-10	"	"	"	"	72	2.87	7 4-10	"	"	"	"
30	1.80	3 2-10	"	"	"	"	75	2.93	7 7-10	"	"	"	"
35	1.93	3 7-10	"	"	"	"	76	2.96	7 8-10	"	"	"	"
40	2.04	4 2-10	1	1 1-2	1 3-4	Web	80	3.06	8 2-10	1 1-8	1 3-4	1 1/8	"
44	2.15	4 6-10	"	"	"	"	84	3.15	8 6-10	"	"	"	"
45	2.17	4 7-10	"	"	"	"	85	3.19	8 7-10	"	"	"	"
48	2.25	5	"	"	"	"	88	3.25	9	"	"	"	"
50	2.28	5 2-10	"	"	"	"	90	3.32	9 2-10	"	"	"	"
52	2.36	5 4-10	"	"	"	"	92	3.38	9 4-10	"	"	"	"
55	2.42	5 7-10	"	"	"	"	95	3.46	9 7-10	"	"	"	"
56	2.45	5 8-10	"	"	"	"	96	3.49	9 8-10	"	"	"	"
60	2.53	6 2-10	"	"	"	Arms	100	3.60	10 2-10	"	"	"	"
64	2.60	6 6-10	"	"	"	"	105	3.78	10 7-10	"	"	"	"
65	2.67	6 7-10	"	"	"	"	110	4.05	11 2-10	"	"	"	"
68	2.77	7	"	"	"	"							

D 782. 12 PITCH.—INVOLUTE AND EPICYCLOIDAL TEETH.

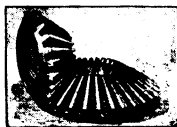
Width Face, 15-16 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
24	\$1.49	2 2-12	7-8	1 3-8	1 9-16	Plain	78	\$2.53	6 8-12	15-16	1 1-2	1 1/4	Arms
27	1.56	2 5-12	"	"	"	"	81	2.59	6 11-12	"	"	"	"
30	1.61	2 8-12	"	"	"	"	82	2.61	7	"	"	"	"
33	1.67	2 11-12	"	"	"	"	84	2.66	7 2-12	"	"	"	"
36	1.72	3 2-12	"	"	"	"	86	2.70	7 4-12	"	"	"	"
39	1.78	3 5-12	"	"	"	Web	87	2.72	7 5-12	"	"	"	"
42	1.85	3 8-12	"	"	"	"	90	2.78	7 8-12	"	"	"	"
45	1.91	3 11-12	"	"	"	"	93	2.84	7 11-12	1	"	1 3-4	"
46	1.93	4	"	"	"	"	94	2.86	8	"	"	"	"
48	1.97	4 2-12	"	"	"	"	96	2.91	8 2-12	"	"	"	"
50	2.00	4 4-12	"	"	"	"	98	2.95	8 4-12	"	"	"	"
51	2.03	4 5-12	"	"	"	"	99	2.97	8 5-12	"	"	"	"
54	2.09	4 8-12	"	"	"	"	102	3.06	8 8-12	"	"	"	"
58	2.17	5	"	"	"	"	105	3.19	8 11-12	"	"	"	"
62	2.25	5 4-12	"	"	"	"	106	3.23	9	"	"	"	"
66	2.33	5 8-12	"	"	"	"	108	3.31	9 2-12	"	"	"	"
70	2.40	6	15-16	1 1-2	1 1/4	Arms	111	3.43	9 5-12	"	"	"	"
72	2.42	6 2-12	"	"	"	"	114	3.55	9 8-12	"	"	"	"
74	2.46	6 4-12	"	"	"	"	117	3.67	9 11-12	"	"	"	"
75	2.48	6 5-12	"	"	"	"	120	3.78	10 2-12	"	"	"	"

D 783. 14 PITCH.—INVOLUTE AND EPICYCLOIDAL TEETH.

Width Face, 13-16 in. Holes Reamed to Standard Size. Rim and Ends of Hub finished.

Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.	Number of Teeth.	Price of Each Gear.	Outside Diam., Inches.	Size of Hole, Inches.	Length of Hub, Inches.	Diam. of Hub, Inches.	Style.
28	\$1.48	2 2-14	13-16	1 1-4	1 7-16	Plain	84	\$2.39	6 2-14	7-8	1 3-8	1 9-16	Arms
35	1.59	2 9-14	"	"	"	"	88	2.47	6 6-14	"	"	"	"
42	1.70	3 2-14	"	"	"	Web	91	2.51	6 9-14	"	"	"	"
48	1.80	3 8-14	"	"	"	"	92	2.53	6 10-14	"	"	"	"
49	1.82	3 9-14	"	"	"	"	96	2.61	7	15-16	1 1-2	1 1/4	"
56	1.93	4 2-14	"	"	"	"	98	2.64	7 2-14	"	"	"	"
60	2.01	4 6-14	"	"	"	"	100	2.70	7 4-14	"	"	"	"
63	2.05	4 9-14	"	"	"	"	104	2.83	7 8-14	"	"	"	"
64	2.08	4 10-14	"	"	"	"	105	2.85	7 9-14	"	"	"	"
68	2.16	5	"	"	"	"	108	2.97	7 12-14	"	"	"	"
72	2.24	5 4-14	"	"	"	"	112	3.12	8 2-14	"	"	"	"
76	2.30	5 8-14	7-8	1 3-8	1 9-16	Arms	119	3.38	8 9-14	"	"	"	"
80	2.34	5 12-14	"	"	"	"	126	3.65	9 2-14	"	"	"	"

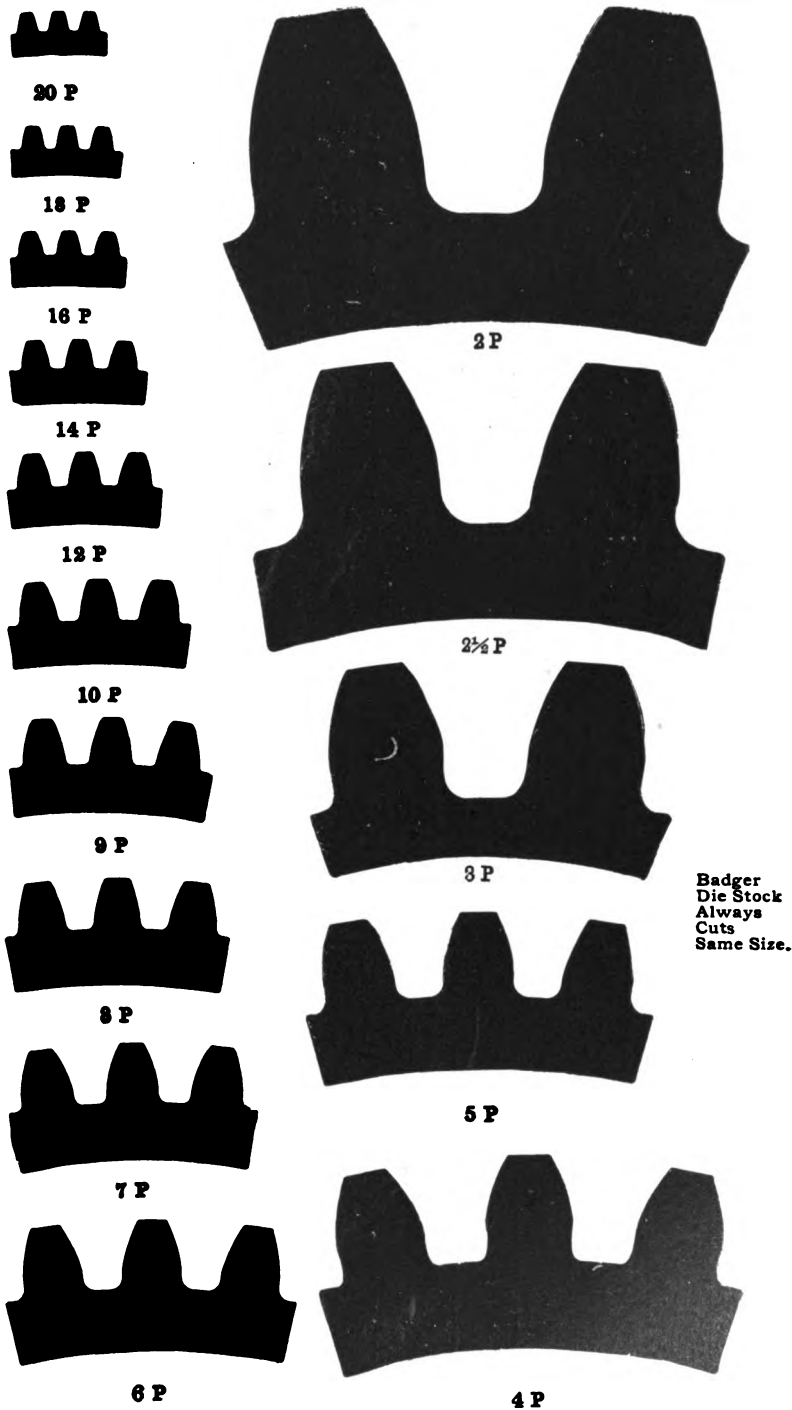
**D 784. PLANED BEVEL GEARS,**

Spur, Spiral and Worm Gears and Racks.

We have unusual facilities for doing all kinds of gear work. We are prepared to furnish Planed Bevel or Mitre Gears to 48 inch diameter.

We are also prepared to cut and hob Worm Gears, to cut Worms, and to cut Spiral and Spur Gears to 84 inch diameter.

D 795. SHOWING COMPARATIVE SIZES OF GEAR TEETH.—INVOLUTE.
CUTS LIFE SIZE.



D 806. BROWN & SHARPE'S CUT GEARS.—INVOLUTE TEETH.

The following gears we have termed **Change Gears**; the faces, for the same pitch, are narrower than those in the preceding pages. They are also different in having the holes of the complete series in each pitch of the same diameter, and in having hubs which project but 1-32 inch outside of rims.

The shapes of teeth in these gears are of the involute form, and they therefore do not require so nice an adjustment for distance of centers.

The holes in the gears are of standard size, the ends of the hubs faced and the rims finished, with teeth accurately cut of involute form.

HOLES REAMED TO STANDARD SIZE. RIM AND ENDS OF HUB FINISHED.

D 807.				D 808.				D 809.				D 810.			
4 Pitch Change.				5 Pitch Change.				6 Pitch Change.				7 Pitch Change.			
INVOLUTE TEETH				INVOLUTE TEETH				INVOLUTE TEETH				INVOLUTE TEETH			
Width Face, 1 1-2				Width Face, 15-16				Width Face, 13-16				Width Face, 1 1-16			
Size of Hole, 1 1-2				Size Hole, 15-16				Size Hole, 13-16				Size Hole, 1 1-16			
Diam. Hub, 2 1-2				Diam. Hub, 2 1-4				Diam. Hub, 2				Diam. Hub, 1 7-8			
L'gth Hub, 1 9-16				L'gth Hub, 1 3-8				L'gth Hub, 1 1-4				L'gth Hub, 1 1-8			
No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.	
12	Plain.	\$2.24		14	Plain.	\$2.01		16	Plain.	\$1.89		18	Plain.	\$1.80	
16	"	2.66		18	"	2.31		20	"	2.11		22	"	1.98	
20	"	3.04		22	"	2.58		24	"	2.33		26	"	2.15	
24	Web.	3.32		26	Web.	2.91		28	Web.	2.54		30	"	2.33	
28	"	3.75		30	"	3.21		32	"	2.76		34	Web.	2.46	
32	"	4.17		34	"	3.50		36	"	3.00		38	"	2.64	We Cu
36	"	4.58		38	"	3.83		40	"	3.23		42	"	2.83	Sheet
40	Arms	4.96		42	Arms	4.13		44	"	3.45		46	"	3.01	Brass
44	"	5.33		46	"	4.45		48	Arms	3.67		50	Arms	3.18	Special
48	"	5.77		50	"	4.74		52	"	3.89		54	"	3.35	Sizes to
52	"	6.20		54	"	5.04		56	"	4.11		58	"	3.52	Order.
56	"	6.64		58	"	5.36		60	"	4.35		62	"	3.69	
60	"	7.08		62	"	5.66		64	"	4.57		66	"	3.87	
64	"	7.52		66	"	5.99		68	"	4.80		70	"	4.05	
				70	"	6.28		72	"	5.04		74	"	4.23	
				90	"	7.82		76	"	5.27		78	"	4.41	
												82	"	4.61	
D 811.				D 812.				D 813.				D 814.			
8 Pitch Change.				9 Pitch Change.				10 Pitch Change.				12 Pitch Change.			
INVOLUTE TEETH				INVOLUTE TEETH				INVOLUTE TEETH				INVOLUTE TEETH			
Width Face, 1 in.				Width Face, 15-16				Width Face, 15-16				Width Face, 7-8			
Size of Hole, 1 in.				Size Hole, 15-16				Size Hole, 15-16				Size of Hole, 7-8			
Diam. Hub, 1 3-4				Dia. Hub, 1 11-16				Dia. Hub, 1 11-16				Diam. Hub, 1 9-16			
L'gth Hub, 1 1-16				L'gth Hub, 1 in.				L'gth Hub, 1 in.				L'gth Hub, 15-16			
No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.		No. of Teeth.	Style.	Price Each Gear.	
20	Plain.	\$1.75		22	Plain.	\$1.73		20	Plain.	\$1.55		26	Plain.	\$1.51	
24	"	1.89		26	"	1.84		24	"	1.61		30	"	1.59	
28	"	2.04		30	"	1.95		28	"	1.73		34	"	1.65	
32	"	2.18		34	"	2.06		32	"	1.81		38	"	1.75	
36	Web.	2.21		38	Web.	2.15		36	"	1.92		42	"	1.83	
34	"	2.27		42	"	2.27		40	"	2.00		46	Web.	1.91	
38	"	2.36		46	"	2.39		44	Web.	2.12		50	"	1.99	
40	"	2.42		50	"	2.51		48	"	2.22		54	"	2.07	
42	"	2.50		54	"	2.63		52	"	2.34		58	"	2.15	
44	"	2.58		58	"	2.76		56	"	2.45		62	"	2.23	
46	"	2.65		62	Arms.	2.87		60	Arms	2.55		66	"	2.32	
48	"	2.72		66	"	2.99		64	"	2.64		70	Arms	2.39	
50	"	2.80		70	"	3.11		68	"	2.75		74	"	2.47	
52	"	2.87		74	"	3.24		72	"	2.85		78	"	2.55	
56	Arms	3.00		78	"	3.36		76	"	2.95		82	"	2.63	
60	"	3.14		82	"	3.47		80	"	3.04		86	"	2.71	
64	"	3.28		86	"	3.58		84	"	3.15		90	"	2.79	
68	"	3.43		90	"	3.70		88	"	3.25		94	"	2.87	
72	"	3.57		94	"	3.82		92	"	3.37		98	"	2.95	
76	"	3.73						96	"	3.46		102	"	3.07	
80	"	3.88						100	"	3.57		106	"	3.23	
84	"	4.03													
88	"	4.17													

To obtain the pitch diameter, divide the number of teeth by the pitch.

BROWN & SHARPE'S STANDARD GEARS

Kept in Stock in Chicago.

HOLES REAMED TO STANDARD SIZE. RIM AND ENDS OF HUB FINISHED.

D 825.			D 826.			D 827.			D 828.		
14 Pitch Change.			16 Pitch Change.			18 Pitch Change.			20 Pitch Change.		
INVOLUTE TEETH			INVOLUTE TEETH			INVOLUTE TEETH			INVOLUTE TEETH		
Width Face, 13-16			Width Face, 3-4			Width Face, 11-16			Width Face, 5-8		
Size Hole, 13-16			Size of Hole, 3-4			Size Hole, 11-16			Size of Hole, 5-8		
Dia. Hub, 17-16			Diam. Hub, 13-8			Dia. Hub, 15-16			Dia. Hub, 13-16		
L'gth Hub, 7-8in.			L'gth Hub, 13-16			L'gth Hub, 3-4in.			L'gth Hub, 11-16		
No. of Teeth.	Style.	Price Each Gear.	No. of Teeth.	Style.	Price Each Gear.	No. of Teeth.	Style.	Price Each Gear.	No. of Teeth.	Style.	Price Each Gear.
28	Plain.	\$1.46	30	Plain.	\$1.42	32	Plain.	\$1.40	34	Plain.	\$1.38
32	"	1.53	34	"	1.47	36	"	1.44	38	"	1.42
36	"	1.59	38	"	1.52	40	"	1.49	42	"	1.46
40	"	1.66	42	"	1.58	44	"	1.53	46	"	1.50
44	"	1.72	46	"	1.63	48	"	1.59	50	"	1.55
48	Web.	1.79	50	"	1.69	52	"	1.63	54	"	1.59
52	"	1.86	52	"	1.71	56	Web.	1.68	58	Web.	1.63
56	"	1.93	54	Web.	1.74	60	"	1.73	62	"	1.67
60	"	2.00	58	"	1.80	64	"	1.78	66	"	1.72
64	"	2.07	62	"	1.85	68	"	1.84	70	"	1.76
68	"	2.14	66	"	1.92	72	"	1.89	74	"	1.80
72	"	2.21	70	"	2.00	76	"	1.94	78	"	1.84
76	Arms	2.25	74	"	2.04	80	"	1.98	82	"	1.89
80	"	2.34	78	Arms	2.08	84	Arms	2.04	86	"	1.93
84	"	2.40	82	"	2.14	88	"	2.09	90	Arms	1.97
88	"	2.47	86	"	2.19	92	"	2.13	94	"	2.02
92	"	2.54	90	"	2.25	96	"	2.18	98	"	2.06
96	"	2.61	94	"	2.29	100	"	2.25	102	"	2.14
100	"	2.67	98	"	2.34	104	"	2.37	106	"	2.27
104	"	2.82	102	"	2.45	108	"	2.50	110	"	2.39
108	"	2.96	106	"	2.58	112	"	2.62	114	"	2.51
112	"	3.11	110	"	2.73	116	"	2.75	118	"	2.64
119	"	3.36	114	"	2.86	120	"	2.88	122	"	2.76
126	"	3.61	118	"	3.03	124	"	3.00	126	"	2.88
136	"	3.95	232	"	5.40				130	"	3.00
144	"	4.24	272	"	6.20						
152	"	4.48									
160	"	4.73									
168	"	4.96									
176	"	5.21									
184	"	5.45									
192	"	5.68									
200	"	5.93									

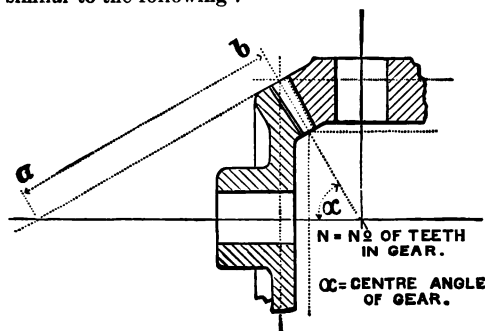
Try our
Brush
Copper for
Electrical
Work.

To obtain the pitch diameter, divide the number of teeth by the pitch.

D 829. CUTTERS FOR MITER AND BEVEL GEARS.

Cutters given in list are carried in stock. Cutters for pitches not given in list will be made to order.

The number of the cutter to be used can be found by laying out a diagram similar to the following :



PRICES.			
Diametral Pitch.	Price of Each Cutter.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.
4	\$5.50	3 3-8	1 1-4
5	4.50	3 1-16	"
6	3.90	2 3-4	1 1-16
8	3.40	2 1-2	"
10	3.00	2 1-8	7-8
12	2.65	2	"
14	2.55	2	"
16	2.45	1 15-16	"
20	2.30	1 7-8	"
24	2.10	1 3-4	"

Measure the back cone radius *a b* for the gear. This is equal to the radius of a spur gear, the number of teeth in which would determine the cutter to

use. Hence twice $a b$ times the diametral pitch equals the number of teeth for which the cutter should be selected. Looking in the list on page 105 the proper number for the cutter can be found.

Thus, let the back cone radius $a b$ be 4 inches and the diametral pitch be 8. Twice four is 8 and 8×8 is 64, from which it can be seen that the cutter must be of shape No. 2, as 64 is between 55 and 134, the range covered by No. 2 cutter.

The number of teeth for which the cutter should be selected can also be found by the following formula :

$$\text{No. of teeth} = \frac{N}{\cos. \alpha}$$

If the gears are miters or are alike, only one cutter is needed; if one gear is larger than the other, two may be needed, the cutter for the second gear being determined the same as for the first.

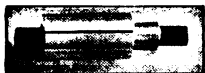
Additional helps on this subject can be found in B. & S. "Practical Treatise on Gearing" (cloth, \$1.00; cardboard, 75 cents), and "Formulas in Gearing" (cloth, \$2.00).

These Cutters are thin enough to cut any bevel gear whose tooth face is not longer than one-third the distance from its outer end to the point where the shaft center-lines meet. This makes the tooth thickness at the inner end not less than two-thirds that at the outer end.

In ordering Cutters for Bevel Gears, if the number of teeth in each gear and the pitch are given, also the angle of the shafts, if different from a right angle, we can select the proper cutter to send.

When an extra length of face is wanted, requiring an especially thin cutter, this length should be specified in the order.

Eight cutters are made for each pitch, and numbered from 1 to 8.



TAPER MANDRELS AND EXPANSION BUSHINGS.

Each Mandrel above No. 3 will take three sizes of Bushings.

D 841.

TAPER MANDRELS.

No.	Price.	Whole Length, In.	Diam. Small End, Inches.	No.	Price.	Whole Length, In.	Diam. Small End, Inches.
3	\$1.40	3 11-16	.3125	9	\$2.60	7 3-16	.90
4	1.50	4 1-16	.35	10	3.00	7 3-4	1.05 For Use of
5	1.65	4 1-2	.45	11	3.50	8 3-8	1.25 Tables, &
6	1.80	5 1-8	.50	12	4.00	9	1.50 Back of
7	2.00	5 15-16	.60	13	4.75	9 5-8	1.75 Book.
8	2.25	6 9-16	.75				

D 842.

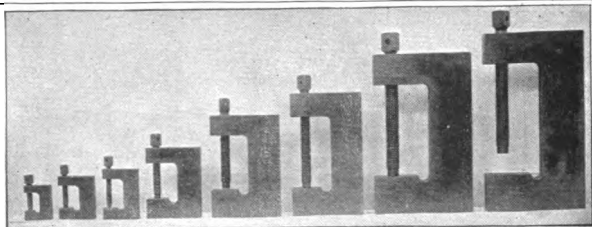
EXPANSION BUSHINGS.

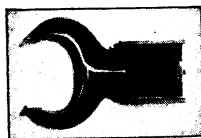
Outside Diam. Bushings, In.	Price.	Length Inches.	For Mandrel No.	Outside Dia. Bushings, In.	Price.	Length Inches.	For Mandrel No.
1-2	\$0.55	1 1-2	3	1 1-2	\$1.40	3 1-2	8
9-16	.55	1 5-8	3	1 5-8	1.70	3 5-8	9
5-8	.65	1 3-4	4	1 3-4	1.70	3 3-4	9
11-16	.65	1 7-8	4	1 7-8	1.70	3 7-8	9
3-4	.65	2	4	2	2.00	4	10
13-16	.80	2 1-8	5	2 1-8	2.00	4 1-8	10
7-8	.80	2 1-4	5	2 1-4	2.00	4 1-4	10
15-16	.80	2 3-8	5	2 3-8	2.40	4 3-8	11
1	.95	2 1-2	6	2 1-2	2.40	4 1-2	11
1 1-16	.95	2 5-8	6	2 5-8	2.40	4 5-8	11
1 1-8	.95	2 3-4	6	2 3-4	2.80	4 3-4	12
1 3-16	1.15	2 7-8	7	2 7-8	2.80	5 7-8	12
1 1-4	1.15	3	7	3	3.80	5	12
1 5-16	1.15	3 1-8	7	3 1-8	3.20	5 1-8	13
1 3-8	1.40	3 1-4	8	3 1-4	3.20	5 1-4	13
1 7-16	1.40	3 3-8	8	3 3-8	3.20	5 3-8	13

D 843.

PRINTERS' RULE.

This Rule is made of German silver 1-32 inch thick. One side is divided for Nonpareil and the other for Agate type. It is used by advertising agents in measuring space occupied by advertisements. No. 786. Price, each.....\$1.25





BROWN & SHARPE'S STANDARD D 854. CALIPER GAUGES.

Price, per Set, $\frac{1}{4}$ to $2\frac{1}{2}$ in., \$100.00.

These gauges are hardened and ground accurately to size, one end answering for outside and the other for inside calipering. By their use, mistakes by the setting of calipers, and variations in measurements by different workmen, will be in a great measure overcome. Their form gives lightness and strength, making them preferable to plugs and rings for frequent use. As furnishing convenient and reliable standard sizes for every day use in the workshop, they will meet a want long felt, and their use will contribute to greater uniformity in the production of the working parts of machinery. Each full set is neatly arranged in a box, and contains sizes from one quarter to two and a half inches diameter, varying by sixteenths of inches up to two inches diameter, and above that by eighths of inches. One or more sizes are furnished to order separately.

PRICES OF STANDARD CALIPER GAUGES.

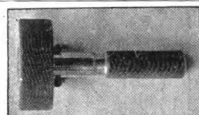
Sizes, Inches.	Prices.	Sizes, Inches.	Prices.	Sizes, Inches.	Prices.
1-4	\$2.50	1 1-16	\$2.80	1 7-8	\$3.60
5-16	2.50	1 1-8	2.80	1 15-16	3.80
3-8	2.50	1 3-16	3.00	2	3.80
7-16	2.50	1 1-4	3.00	2 1-8	4.00
1-2	2.50	1 5-16	3.20	2 1-4	4.20
9-16	2.50	1 3-8	3.20	2 3-8	4.40
5-8	2.50	1 7-16	3.30	2 1-2	4.60
11-16	2.50	1 1-2	3.30	Special Sizes.	
3-4	2.50	1 9-16	3.40	2 9-16	4.80
13-16	2.60	1 5-8	3.40	2 5-8	5.00
7-8	2.60	1 11-16	3.40	2 11-16 to 2 3-4	5.50
15-16	2.60	1 3-4	3.50	2 13-16 to 2 15-16	6.70
1	2.60	1 13-16	3.50	3	6.90

Above 3 inches the gauges are in two parts for each size—one part for inside measurement and one part for outside measurement.

PRICES FOR BOTH PARTS.

3 in. to 3 1-4 in.,	\$7.00 for both	3 13-16 in. to 4 in.,	\$8.00 for both
3 5-16 " " 3 1-2 "	7.30 "	4 1-16 " " 5 "	8.50 "
3 9-16 " " 3 3-4 "	7.50 "	5 5-16 " " 6 "	9.00 "

**Special Drills,
Made to Order.**

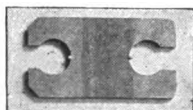


BROWN & SHARPE'S STANDARD D 855. INTERNAL AND EXTERNAL CYLINDRICAL GAUGES.

Each set is arranged in a box, and contains sizes from one-fourth to two inches, varying by sixteenths of inches. Special sizes made to order. Price, per set, \$325.00.

PRICES OF STANDARD INTERNAL AND EXTERNAL CYLINDRICAL GAUGES.

Size, In.	Intern'l	Ext'rnl	Both.	Sizes, In.	Intern'l	External.	Both.
1-4	\$3.00	\$4.45	\$7.45	1 11-16	\$6.00	\$10.35	\$16.35
5-16	3.00	4.45	7.45	1 3-4	6.00	10.35	16.35
3-8	3.30	4.95	8.25	1 13-16	6.60	10.85	17.45
7-16	3.30	4.95	8.25	1 7-8	6.60	10.85	17.45
1-2	3.30	4.95	8.25	1 15-16	7.20	11.35	18.55
9-16	3.30	4.95	8.25	2	7.20	11.35	18.55
5-8	3.60	5.40	9.00	Special Sizes.			
11-16	3.60	5.40	9.00	2 1-16	7.45	12.65	20.10
3-4	3.60	5.40	9.00	2 1-8	7.45	12.65	20.10
13-16	3.90	5.90	9.80	2 3-16	7.70	12.85	20.55
7-8	3.90	5.90	9.80	2 1-4	7.70	12.85	20.55
15-16	3.90	5.90	9.80	2 5-16	7.95	13.10	21.05
1	4.50	6.90	11.40	2 3-8	7.95	13.10	21.05
1 1-16	4.50	6.90	11.40	2 7-16	8.20	13.30	21.50
1 1-8	4.50	6.90	11.40	2 1-2	8.20	13.30	21.50
1 3-16	4.80	7.90	12.70	2 9-16	8.45	13.55	22.00
1 1-4	4.80	7.90	12.70	2 5-8	8.45	13.55	22.00
1 5-16	4.80	7.90	12.70	2 11-16	8.70	13.75	22.45
1 3-8	5.10	8.85	13.95	2 3-4	8.70	13.75	22.45
1 7-16	5.10	8.85	13.95	2 13-16	8.95	14.00	22.95
1 1-2	5.10	8.85	13.95	2 7-8	8.95	14.00	22.95
1 9-16	5.40	9.85	15.25	2 15-16	9.20	14.25	23.45
1 5-8	5.40	9.85	15.25				



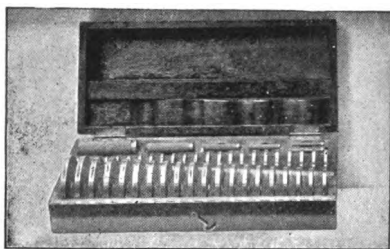
D 866.

LIMIT GAUGES.

The accurate production of multiple parts requires accurate gauges, and the most economical production requires limit gauges in order that no time may be lost in making work unduly accurate and still making it so accurate that two or more parts when brought together will fit as accurately as the necessities of the case may require.

The cut shown represents external gauge that is commonly used. Other forms, sizes and limits furnished as required. When two sizes are made on one piece, the words, "go on," or "not go on;" "go in," or "not go in," stamped on the gauge make more clear to the workman the use of the gauge.

Prices quoted on limit or on special gauges of all descriptions when specifications, drawings or samples of work are sent. The degree of accuracy required should be stated in thousandths or fractions of a thousandth of an inch, as the price depends to a large extent on such accuracy.

D 867. BROWN & SHARPE'S STANDARD REFERENCE DISKS.

These Disks are used, frequently without handles, for setting Calipers, testing measuring tools, and determining sizes in shop practice. With handles, they are used as internal Cylindrical Gauges. They are designed, however, to serve principally as reference, not as working gauges. They are made of steel, hardened and accurately ground to size. The diameter of each is stamped upon it in 16ths and

also in decimals of an inch. The sides of the Disks are left unpolished, the finish being the same as that of our hardened wire gauges. A complete set consists of 45 Disks and 6 handles, and is neatly arranged in a suitable box. The 1 4 and 5-16 inch Disks are furnished with the handles attached. Price, per set, \$50.00

PRICE OF SINGLE DISKS.

Size, Inches.	Price Each.	Size, Inches.	Price Each.	Size, Inches.	Price Each.	Size, Inches.	Price Each.	Size, Inches.	Price Each.
1-4 *	\$1.50	13-16	\$1.05	1 3-8	\$1.25	1 15-16	\$1.55	2 1-2	\$1.80
5-16 *	1.50	7-8	1.05	1 7-16	1.25	2	1.55	2 9-16	1.95
3-8	.90	15-16	1.05	1 1-2	1.25	2 1-16	1.65	2 5-8	1.95
7-16	.90	1	1.10	1 9-16	1.40	2 1-8	1.65	2 11-16	1.95
1-2	1.00	1 1-16	1.10	1 5-8	1.40	2 3-16	1.65	2 3-4	2.10
9-16	1.00	1 1-8	1.10	1 11-16	1.40	2 1-4	1.65	2 13-16	2.10
5-8	1.00	1 3-16	1.10	1 3-4	1.40	2 5-16	1.80	2 7-8	2.25
11-16	1.00	1 1-4	1.10	1 13-16	1.55	2 3-8	1.80	2 15-16	2.25
3-4	1.05	1 5-16	1.25	1 7-8	1.55	2 7-16	1.80	3	2.25

* With Handles.

PRICES OF HANDLES.

Handles for use with 3-8 to 9-16 inch Disks	\$0.65
" " " 5-8 " 1 1-16 inch Disks	.75
" " " 1 1-8 to 1 3-4 " "	.80
" " " 1 13-16 to 3 " "	.90

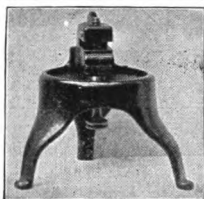


D 868.

HOLLOW, OR LATHE MILLS.

Special
Taps
Made to
Order.

Size Hole, Inches.	Price Each.	Outside Diam., In.	Length, Inches.	Size Hole, Inches.	Price Each.	Outside Diam., In.	Length, Inches.
3-32	\$1.00	5-8	1 1-2	3-8	\$1.50	1	1 3-4
1-8	1.00	5-8	1 1-2	7-16	2.00	1	1 3-4
5-32	1.00	5-8	1 1-2	1-2	2.00	1	1 3-4
3-16	1.00	5-8	1 1-2	9-16	2.00	1 1-4	2
7-32	1.00	5-8	1 1-2	5-8	2.00	1 1-4	2
1-4	1.00	5-8	1 1-2	11-16	2.50	1 1-2	2
9-32	1.50	3-4	1 1-2	3-4	2.50	1 1-2	2
5-16	1.50	3-4	1 1-2	7-8	2.50	1 3-4	2 1-4
11-32	1.50	3-4	1 1-2	1	2.50	1 3-4	2 1-4

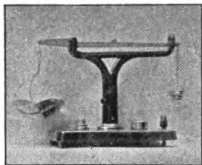


D 879.

SHEET METAL GAUGE.

For Machinists, Jewelers, Silversmiths, Sheet Brass
Rollers and Workers, Sheet Iron Workers,
Rubber Manufacturers, Paper
Makers, Type Founders,
Etc., Etc.

Price, each\$10.00



D 880. SAMPLE WEIGHING SCALES

For Accurate Weighing.

Price, each.....\$10.00

These scales will weigh one pound by ten thousandths of a pound. They are well adapted for weighing small articles, screws, samples of paper, color, drugs, etc., for the purpose of computing large quantities. They also answer as postal scales. The finished parts are all nickel-plated, and the stand is japanned and ornamented. Nine balancing weights accompany the scales, viz.: one each respectively of 100, 200, 400, 800, 1000, 2000, 4000 ten thousandths, and also one ounce weight for postage weighing.

7000	grains equal one pound	avoirdupois.			
One	ten thousandth of a pound	equals	7-10	of a grain.	
156	1-4	"	"	"	1-4 of an ounce
312	1-2	"	"	"	1-2 " "
468	3-4	"	"	"	3-4 " "
625	"	"	"	"	1 " "
2500	"	"	"	"	1-4 of a pound.
5000	"	"	"	"	1-2 " "
7500	"	"	"	"	3-4 " "

Helmet Oil
Lubricates
Anything.

We also make scales to weigh by the metric system to 1-100 gramme. Weights, 1, 2, 5, 10, 20, 40, 60, 100 and 200 grammes.



STANDARD CAST IRON SURFACE PLATES.

D 881.

Surface Plates are as indispensable in obtaining correct plane surfaces, as Standard Cylindrical Gauges are for sizes of holes.

These plates are usually sold singly, not in pairs, as shown in cut. Unless otherwise specified, price is quoted for a single plate, with box and cover.

3½ x 12 in., wt., 11 lbs.	9 x 9 in., wt., 16 lbs.	16 x 16 in., wt., 62 lbs.
4 x 15 " " 16 "	9 x 14 " " 27 "	18 x 18 " " 65 "
4½ x 6 " " 5 "	10 x 15 " " 35 "	18 x 24 " " 128 "
5 x 16 " " 21 "	10 x 30 " " 99 "	18 x 36 " " 288 "
6 x 6 " " 7 "	12 x 12 " " 29 "	20 x 30 " " 178 "
6 x 12 " " 19 "	12 x 18 " " 53 "	22 x 30 " " 752 "
6 x 50 " " 120 "	12 x 24 " " 100 "	24 x 24 " " 164 "
6½ x 18 " " 30 "	14 x 14 " " 47 "	24 x 36 " " 298 "
7 x 7½ " " 11 "	14 x 18 " " 62 "	24 x 48 " " 442 "
7 x 10 " " 15 "	14 x 21 " " 93 "	24 x 60 " " 666 "
8 x 12 " " 21 "	15 x 30 " " 139 "	36 x 68 " " 1024 "

Other Sizes Made to Order.



D 882.

HOLE GAUGES.

This Gauge will be found useful to underwriters and others in determining the discharging capacity of sprinkling pipes for fire extinguishers in factories and other buildings.

No. 790. Price, each.....\$2.00

AREAS OF CIRCLES FROM .05 INCH TO .25 INCH BY HUNDREDTHS OF AN INCH.

Diam.	Area in.	Diam.	Area in.	Diam.	Area in.
.05	.0019635	.12	.011309	.19	.028352
.06	.0028274	.13	.013273	.20	.031416
.07	.0038484	.14	.015393	.21	.034636
.08	.0050265	.15	.017671	.22	.038013
.09	.0063617	.16	.020106	.23	.041547
.10	.0078539	.17	.022698	.24	.045239
.11	.0095033	.18	.025446	.25	.049087

BROWN & SHARPE'S TOOLS.

MICROMETER CALIPERS.

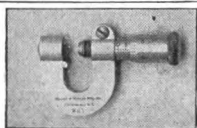
Micrometer Calipers form convenient and accurate instruments for small external measurements. They are made in different sizes and styles to measure all sizes to twenty-four inches. They are graduated to read to thousandths of an inch, but one-half and one-quarter thousandths are readily estimated. Some of the calipers have verniers by which sizes can be obtained to ten-thousandths. We also graduate some of these instruments to read to hundredths of a millimeter instead of to thousandths of an inch.

The gauge screws, except in Caliper No. 1, are encased and protected from dirt and liability to injury. The parts most subject to wear are hardened, and means of adjustment are provided to compensate for wear of the screw or nut. The decimal equivalents stamped on the frame are very convenient, and render possible the immediate expression of readings in eighths, sixteenths, thirty-seconds and sixty-fourths of an inch. When graduated to read to hundredths of a millimeter, the tables of decimal equivalents are omitted.

The chief mechanical principle embodied in the construction is that of a screw free to move in a fixed nut. An opening, to receive the work to be measured, is afforded by the backward movement of the screw, and the size of the opening is indicated by the graduations.

The pitch of the screw is forty to the inch. The graduation of the hub, in a line parallel to the axis of the screw, is forty to the inch, and is figured 0, 1, 2, etc., every fourth division. As the graduation conforms to the pitch of the screw, each division equals the longitudinal distance traversed by the screw in one complete rotation, and shows that the caliper has been opened one-fortieth or .025 of an inch. The beveled edge of the thimble is graduated into twenty-five parts, and figured every fifth division, 0, 5, 10, 15, 20. Each division, when passing the line of graduations on the hub, indicates that the screw has made one-twenty-fifth of a turn, and the opening of the caliper increased one twenty-fifth of one-fortieth, or a thousandth of an inch.

Hence, to read the caliper, multiply the number of divisions visible on the scale of the hub by twenty-five, and add the number of divisions on the scale of the thimble, from zero to the line coincident with the line of graduations on hub.

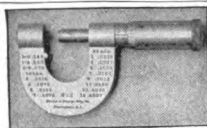


D 893. MICROMETER CALIPER, No. 1.

(Pocket Sheet Metal Gauge.) This Caliper measures all sizes less than three-tenths inch by thousandths of an inch.

Price, each, \$4.00. In Morocco case, \$4.50.

Parallel
Clamps
Make
Good
Drilling
Jigs.



D 894. MICROMETER CALIPER, No. 2.

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than one-half inch by thousandths of an inch.

This Caliper is made to measure all sizes less than thirteen millimeters by hundredths of a millimeter. When so made the table of decimal equivalents is omitted.

Price, each.....\$4.50 | In Morocco case.....\$5.00



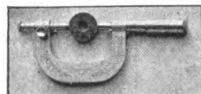
D 895. MICROMETER CALIPER, No. 23.

U. S. STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL.

The Caliper is graduated to show the weight of sheet or plate iron or steel in ounces per square foot. It measures all thicknesses less than 0.000000, or approximately $\frac{1}{2}$ inch, each of the divisions on the thimble indicating an ounce, and each division on the barrel, 20 ounces. By the table of equivalents stamped on the frame of the Caliper, the gauge number of the sheet or plate can be quickly determined when its weight per square foot has been ascertained.

Special descriptive circular sent on application.

Price, each.....\$5.00 | In Morocco case.....\$5.75



D 896. MICROMETER CALIPER, No. 30.

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than two inches by thousandths of an inch.

This Caliper is also made to measure all sizes less than fifty millimeters by hundredths of a millimeter. When so made the table of decimal equivalents is omitted.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$8.00 | In Morocco case.....\$9.00



D 907. MICROMETER CALIPER, No. 31.

ENGLISH OR METRIC MEASURE.

This Caliper differs from Micrometer Caliper No. 30, only in having a Clamp Screw, by which the measuring spindle can be held in any desired position.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$8.50 | In Morocco case.....\$9.50



D 908. MICROMETER CALIPER, No. 32.

This Caliper differs from Micrometer Caliper No. 30, only in being graduated to read to ten-thousandths, as well as thousandths of an inch.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$9.00 | In Morocco case.....\$10.00

Milling
Cutters
Made for
Bicycle
Work.



D 909. MICROMETER CALIPER, No. 33.

This Caliper differs from Micrometer Caliper No. 32, only in having a Clamp Screw, by which the measuring spindle can be held in any desired position.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$9.50 | In Morocco case.....\$10.50



D 910. MICROMETER CALIPER, No. 34.

ENGLISH OR METRIC MEASURE.

This Caliper differs from Micrometer Caliper No. 35, only in having a Clamp Screw, by which the measuring spindle can be held in any desired position.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$6.50 | In Morocco case.....\$7.50



D 911. MICROMETER CALIPER, No. 35.

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes above one inch and less than two inches by thousandths of an inch.

It is also made to measure all sizes above twenty-five and less than fifty millimeters by hundredths of a millimeter. When so made, the table of decimal equivalents is omitted.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$6.00 | In Morocco case.....\$7.00



D 912. MICROMETER CALIPER, No. 36.

This Caliper differs from Micrometer Caliper No. 35, English measure, only in being graduated to read to ten-thousandths, as well as thousandths of an inch. A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$7.00 | In Morocco case.....\$8.00



D 913. MICROMETER CALIPER, No. 37.

This Caliper differs from Micrometer Caliper No. 36, only in having a Clamp Screw, by which the measuring spindle can be held in any desired position. A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$7.50 | In Morocco case.....\$8.50



D 914. MICROMETER CALIPER, No. 38.

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes above one inch and less than two inches by thousandths of an inch.

The outer end of the frame is the same size as the measuring spindle, and the edges of the measuring surfaces are not beveled but are left square. It gauges under a shoulder or measures a small projection on a plane surface.

This Caliper is also made to measure all sizes between twenty-five and fifty millimeters by hundredths of a millimeter. When so made, the table of decimal equivalents is omitted.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each.....\$6.00 | In Morocco case.....\$7.00

BROWN & SHARPE'S TOOLS.

**D 925. MICROMETER CALIPER, No. 39.**

ENGLISH OR METRIC MEASURE.

This Caliper differs from Micrometer Caliper No. 38, only in having a Clamp Screw, by which the measuring spindle can be held in any desired position. A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each\$6.50 | In Morocco case\$7.50

**D 926. MICROMETER CALIPER, No. 40.**

This Caliper differs from Micrometer Caliper No. 38, English measure, only in being graduated to read to ten-thousandths as well as thousandths of an inch.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

Price, each\$7.00 | In Morocco case\$8.00

**D 927. MICROMETER CALIPER, No. 41.**

This Caliper differs from Micrometer Caliper No. 40, only in having a Clamp Screw, by which the measuring spindle can be held in any position.

A Standard Gauge, to be used in adjusting the Caliper, is sent with each one.

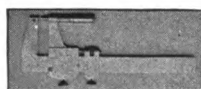
Price, each\$7.50 | In Morocco case\$8.50

**D 928. MICROMETER CALIPER, No. 60.**

This Caliper measures all sizes to six inches in length and four inches in diameter by thousandths of an inch. The slide has an adjusting screw and can be set accurately by means of the graduated lines on the bar. All fractions of inches are obtained by means of the micrometer screw.

Price, each\$30.00

Badger
Die Stock
Always
Cuts
Same Size.

**D 929. MICROMETER CALIPER, No. 64.**

This Caliper, similar in design to Micrometer Caliper No. 60, is made to measure all sizes to twelve inches in length and six inches in diameter by thousandths of an inch.

Price, each\$35.00

**D 930. MICROMETER CALIPER, No. 68.**

This Caliper, similar in design to Micrometer Caliper No. 60, is made to measure all sizes to twenty-four inches in length and six inches in diameter by thousandths of an inch.

Price, each\$45.00

**D 931. PAPER GAUGE MICROMETER CALIPER, No. 70.**

ENGLISH OR METRIC MEASURE.

This Paper Gauge Micrometer Caliper, or Micrometer Caliper with Large Measuring Surfaces, measures all sizes less than three-eighths of an inch, by thousandths of an inch. In measuring the thickness of paper, cardboard, sheet rubber, or other yielding substances, it is advantageous to use Micrometer Calipers provided with discs or washers on the ends of the measuring spindle and adjusting screw. The comparatively large sizes have less tendency to compress the objects measured, and enable accurate measurements to be quickly obtained. This Caliper is also made to measure all sizes less than nine millimeters by hundredths of a millimeter. When so made, the table of decimal equivalents is omitted.

Price, each\$5.50 | In Morocco case\$6.00

**D 932. MICROMETER CALIPER, No. 3.**

This Caliper differs from Micrometer Caliper No. 2 English, only in being graduated to read to ten-thousandths, as well as thousandths of an inch.

Price, each\$5.50 | In Morocco case\$6.00



D 943. MICROMETER CALIPER, No. 4.

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than one-half inch by thousandths of an inch. The outer end of the frame is the same size as the measuring spindle, and the edges of the measuring surfaces are not beveled but are left square. It gauges under a shoulder, or measures a small projection on a plain surface. This Caliper is also made to measure all sizes less than thirteen millimeters by hundredths of a millimeter. When so made the table of decimal equivalents is omitted.

Price, each.....\$4.50 | In Morocco case.....\$5.00

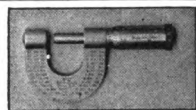


D 944. MICROMETER CALIPER, No. 5.

This Caliper differs from Micrometer Caliper No. 4, English, only in being graduated to read to ten-thousandths, as well as thousandths of an inch.

Price, each.....\$5.50 | In Morocco case...\$6.00

Special
Taps,
Reamers,
Milling
Cutters,
Made to
Order.



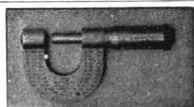
D 945. MICROMETER CALIPER, No. 6.

FOR ELECTRICIANS.

This Caliper, arranged for the users of wire for electrical purposes, measures all sizes to 0000, B. & S. Gauge, by tenths of mils.

The equivalents, expressed in mils., of the different sizes of wire from 0000 to 20, B. & S. Gauge, are stamped on one side of the frame, and the circular mils. of the same sizes on the other. Three formulas are stamped on the thimble: One for the weight, length in feet and diameter being known; one for length in feet, weight and diameter being known, and one for resistance in ohms per hundred feet at 75 deg. F., length and diameter being known.

Price, each.....\$5.50 | In Morocco case.....\$6.00



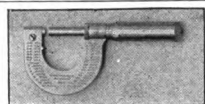
D 946. MICROMETER CALIPER, No. 7.

FOR ELECTRICIANS.

This Caliper differs from Micrometer Caliper No. 6, only in that the equivalents stamped on one side of the frame are for wire from 21 to 44, B. & S.

Gauge, and the resistance in ohms per hundred feet at 75 deg. F., of the same sizes on the other.

Price, each.....\$5.50 | In Morocco case.....\$6.00



D 947. MICROMETER CALIPER, No. 8.

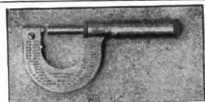
ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than an inch, by thousandths of an inch. The adjustment of the measuring screw is made by an adjustable threaded

nut which produces the necessary friction by binding the thread evenly, on the angle, thus obviating the use of slots the points of which are apt to rough the thread if improperly clamped. Every Caliper is provided with a clamp nut which clamps the spindle and preserves the setting.

This Caliper is also made to measure all sizes less than twenty-five millimeters by hundredths of a millimeter. When so made, the table of decimal equivalents is omitted.

Price, each.....\$5.00 | In Morocco case.....\$5.75



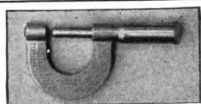
D 948. MICROMETER CALIPER, No. 10.

This Caliper measures all sizes less than an inch and is graduated to read to thousandths of an inch by the divisions shown on the thimble, and *ten thousandths* of an inch by a Vernier on the front of

the barrel. The adjustment of the measuring screw is made by an adjustable threaded nut which produces the necessary friction by binding the thread evenly on the angle, thus obviating the use of slots, the points of which are apt to rough the thread if improperly clamped.

Every Caliper is provided with a clamp nut which clamps the spindle and preserves the setting.

Price, each.....\$6.00 | In Morocco case.....\$6.75



D 949. MICROMETER CALIPER, No. 15.

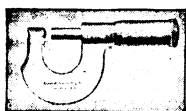
ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than an inch by thousandths of an inch. This Caliper is also made to measure all sizes less than twenty-five

millimeters by hundredths of a millimeter. When so made, the table of decimal equivalents is omitted.

Price, each.....\$5.00 | In Morocco case.....\$5.75

BROWN & SHARPE'S TOOLS.

**D 959. MICROMETER CALIPER, No. 14.**

FOR MEASURING THE THICKNESS OF TUBING.

This Caliper was designed especially to meet the demand for an instrument to *measure accurately* the thickness of tubing. It will measure the thickness of tubing from 3-8 inch inside diameter upward by one-thousandth of an inch.

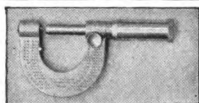
As shown in cut, the lower part of the frame is small enough to readily enter a 3-8 tube. The anvil, or fixed measuring point, is *rounded* on the end so that it touches at only one point on the inside of the tube, and the end of the movable spindle being flat, touches at only one point on the outside, thus giving the exact thickness of the tube.

Price, each.....\$4.50 | In Morocco case.....\$5.00

**D 960. MICROMETER CALIPER, No. 16.**

This Caliper differs from Micrometer Caliper No. 15, English, only in being graduated to read to ten-thousandths, as well as to thousandths of an inch.

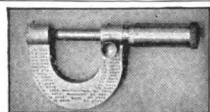
Price, each.....\$6.00 | In Morocco case.....\$6.75

**D 961. MICROMETER CALIPER, No. 17.**

ENGLISH OR METRIC MEASURE.

This Caliper differs from Micrometer Caliper No. 15, only in having a Clamp Screw by which the measuring spindle can be held in any desired position.

Price, each.....\$5.50 | In Morocco case.....\$6.25

**D 962. MICROMETER CALIPER, No. 18.**

This Caliper differs from Micrometer Caliper No. 17, English, only in being graduated to read to ten-thousandths of an inch, as well as thousandths of an inch.

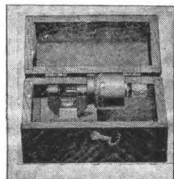
Price, each.....\$6.50 | In Morocco case.....\$7.25

**D 963. PAPER GAUGE MICROMETER CALIPER, No. 1.**

ENGLISH MEASURE.

This size is particularly well adapted for the pocket, has Large Measuring Surfaces, and measures all sizes less than one-quarter of an inch, by thousandths of an inch. In measuring the thickness of paper, cardboard, sheet rubber, or other yielding surfaces, it is advantageous to use Micrometer Calipers provided with discs or washers on the ends of the measuring spindle and adjusting screw. The comparatively large surfaces have less tendency to compress the objects measured, and enable accurate measurements to be quickly obtained.

Price, each.....\$5.00 | In Morocco case.....\$5.50

**D 964. MICROMETER CALIPER, No. 75.**

ENGLISH OR METRIC MEASURE.

This Caliper measures all sizes less than one-half inch by ten-thousandths of an inch. The measurements can be read directly from the barrel; the screw has fifty threads, and the barrel is divided into two hundred equal parts.

This Caliper will be found of service to wire drawers, watchmakers and others who desire fine measurements and whose work is of such a class that a Micrometer Caliper can be used when placed on a bench. This Caliper is also made to measure all sizes less than thirteen millimeters by hundredths of a millimeter.

Price, each, in Cherry case.....\$18.00

**Badger
Die
Stocks
for
Bicycle
Use.**

**D 965.****MICROMETER STAND.**

For holding Micrometers, instead of holding them in the hand, thus preventing the heat of the hand from changing measurements.

Price, each.....\$0.75

**D 976.****SCREW THREAD MICROMETER CALIPER.**

This Caliper is intended for the accurate measurement of V threads on screws, standard screws, taps, thread gauges, etc., by measuring the actual thread.

The distinctive feature in the construction of this Caliper is that the end of the movable spindle is pointed, and the fixed end or "anvil" is V-shaped. Enough is taken from the end of the point and the bottom of the V is carried down low enough, so that they will not rest on the bottom or top of the thread to be measured, but on the cut surface. As the thread itself is measured, it will be seen that the actual outside diameter of the piece does not enter into consideration.

As we measure one-half of the depth of the thread from the top, on each side, the diameter of the thread as indicated by the Caliper, or the pitch diameter, is the full size of the thread less the depth of one thread. This depth is obtained by dividing the constant .866, the sine of 60 degrees, by the number of threads to the inch. For example: What should a 1-inch screw, 8 threads to the inch, threads V shape, measure by this Caliper? From the whole diameter subtract .866 divided by the number of threads to the inch, or from 1, subtract .866 divided by 8 which equals 1 minus .1082 or .8918.

As the U. S. Standard thread is flatted 1-8 of its own depth on top, it follows that the pitch diameter of the thread is increased 1-8 on each side, equaling 1-4 of the whole depth, and instead of the constant .866, we use the constant .6495, which is 3-4 of .866.

When the point and the anvil are in contact the 0 represents a line drawn through the plane A B, and if the Caliper is opened, say to .500, it represents the distance of the two planes .500-inch apart.

While the movable point measures all pitches, the fixed "anvil" is limited in its capacity, for if made large enough to measure a 4-pitch thread it would be too wide at the top to measure a 24-pitch thread, and if made to measure a 24-pitch thread it would be so small that the thread would not obtain a proper bearing in the anvil. Thus, each caliper is limited in the range of threads that the anvil can measure, and in making inquiries, or giving orders, if customers will give information as to the range of threads that they wish to measure, we will advise as to the caliper or calipers best suited to measure that range.

The Caliper is made in two sizes, 1 inch and 2 inch. Prices on application.

**MICROMETER CALIPERS WITH FRICTION ATTACHMENT.**

This Attachment can be furnished with any of our Micrometers, and is convenient where a number of measurements have to be quickly taken or where

a Caliper is in comparatively unskilled hands, as the objects to be measured can be subjected to about the same degree of pressure.

Micrometers with the Friction Attachment may be used in the ordinary way. The Attachment can be adjusted to compensate for wear.

For Micrometer Calipers with Friction Attachment, add 50 cents to the regular price.

D 978. NEW RATCHET STOP FOR MICROMETER CALIPERS.

We give herewith an illustration showing a new Ratchet Stop which is now applied to micrometer calipers by the Brown & Sharpe Manufacturing Company.

Its prime object is to insure that the contact points shall be closed upon work to be measured with the same pressure in all cases, and thus conduce to the accuracy and facility of making such measurements.

As shown in the sketch, the lower end of the thumb nut A forms the ratchet and is held in place by the screw E. The pawl B, which engages the ratchet, is held against the same by the spiral spring C. It will be easily seen that the combination of ratchet and pawl is such that, when closing the tool upon pieces to be measured, it can be closed repeatedly with an even pressure. If more than a certain degree of pressure is exerted, the ratchet A will slip by the pawl B and prevent turning the measuring spindle.

In opening the tool, the pawl positively engages the ratchet so that it cannot slip by, thus making the ratchet stop positive in its return.

Both the ratchet and pawl are hardened, and the wear on these parts is practically imperceptible.

The Ratchet Stop can be furnished with any of our Micrometer Calipers, and will be found convenient where a number of measurements have to be quickly taken, as it enables the objects measured to be subjected to the same degree of pressure.

For Micrometer Calipers with Ratchet Stop, add 50 cents to regular price.

Gardner
Die Stock is
Adjustable.



D 989.





STANDARD END MEASURING RODS.

The Standard End Measuring Rods are made of steel, hardened on the ends and accurately ground, so that the ends are sections of true spheres, having diameters equal to those of the length of the rods. Rods made by this method can be used in measuring rings, cylinders, etc., in setting calipers, comparing gauges to other work of like character, and at the same time are especially useful in measuring parallel surfaces, as the Spherical Ends will pass by such surfaces without cramping, as would spheres of like diameters. We furnish them in all lengths from 3 inches to 16 inches, inclusive. The Rods from 3 inches to 8 inches are 3-8 inch in diameter, and larger than 8 inches, 1-2 inch in diameter.

Size, Inches.....	3	4	5	6	7	8	9
Price, each.....	\$2.50	\$2.75	\$3.00	\$3.25	\$3.50	\$3.75	\$4.00
Size, Inches.....	10	11	12	13	14	15	16
Price, each.....	\$4.25	\$4.50	\$4.75	\$5.00	\$5.25	\$5.50	\$5.75

All the intermediate sizes furnished at the price of the size next larger.

**U. S. STANDARD SCREW
D 990. THREADS.**

Diameter of Screw.	Threads per inch.	Diameter at root of Thread.	Width of Flat.
			
1-4	20	.185	.0062
5-16	18	.240	.0069
3-8	16	.294	.0078
7-16	14	.344	.0089
1-2	13	.400	.0096
9-16	12	.454	.0104
5-8	11	.507	.0113
3-4	10	.620	.0125
7-8	9	.731	.0138
1	8	.837	.0156
1 1-8	7	.940	.0178
1 1-4	7	1.065	.0178
1 3-8	6	1.160	.0208
1 1-2	6	1.284	.0208
1 5-8	5 1-2	1.389	.0227
1 3-4	5	1.491	.0250
1 7-8	5	1.616	.0250
2	4 1-2	1.712	.0277
2 1-4	4 1-2	1.962	.0277
2 1-2	4	2.176	.0312
2 3-4	4	2.426	.0312
3	3 1-2	2.629	.0357
3 1-4	3 1-2	2.879	.0357
3 1-2	3 1-4	3.100	.0384
3 3-4	3	3.317	.0417
4	3	3.567	.0417
4 1-4	2 7-8	3.798	.0435
4 1-2	2 3-4	4.028	.0454
4 3-4	2 5-8	4.256	.0476
5	2 1-2	4.480	.0500
5 1-4	2 1-2	4.730	.0500
5 1-2	2 3-8	4.953	.0526
5 3-4	2 3-8	5.203	.0526
6	2 1-4	5.423	.0555

**SCREW PITCH GAUGE,
No. 20.**

22 Pitches, Including Pipe
Thread Pitches.



D 991.

Special
Taps,
Any Size,
Made to
Order.

This Screw Pitch Gauge will measure the threads of nuts as well as of screws, and contains the pitches 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, on one end, and 22, 24, 26, 27, 28, 30, 32, 34, 36, 38 and 40, on the other end.

The arrangement of blades hinged on each end of the case enables any desired number to be quickly placed in position for use.

We call attention to the following facts:

There are 22 pitches, including pipe thread pitches, 11½ and 27. The 8 pitch can be determined by using the 16 pitch blade.

The 11 smaller pitches are on blades made narrower than the 11 larger ones, so that they have a wider range of use in measuring the threads of nuts than would be the case were they all of a size.

The gauge numbers are stamped on the outside of the frame, as well as on both sides of each blade, allowing the user to determine the position of a desired number at a glance.

Price, each..... \$1.00


D 992. SCREW PITCH GAUGE

For 16 Pitches.

10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40.

Price, each.....\$0.75


D 993. SCREW PITCH GAUGE

For 25 Pitches. U. S. Standard Thread.

2¼, 2½, 2¾, 2⅝, 2⅞, 2⅞, 3, 3¼, 3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, and Gauge for grinding Thread Tool. Price, each.....\$1.50

D 1004. TWIST DRILL AND STEEL WIRE GAUGE.



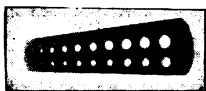
This Gauge is sent out finished black, but will be sent polished if desired.

No. 774. Price, each.....\$1.25

SIZES OF THE NUMBERS OF TWIST DRILL AND STEEL WIRE GAUGE.

No.	Size of No. in D'cmls.	No.	Size of No. in D'cmls.	No.	Size of No. in D'cmls.	No.	Size of No. in D'cmls.	No.	Size of No. in D'cmls.	No.	Size of No. in D'cmls.
1	.2280	11	.1910	21	.1590	31	.1200	41	.0960	51	.0670
2	.2210	12	.1890	22	.1570	32	.1160	42	.0935	52	.0635
3	.2130	13	.1850	23	.1540	33	.1130	43	.0890	53	.0595
4	.2090	14	.1820	24	.1520	34	.1110	44	.0860	54	.0550
5	.2055	15	.1800	25	.1495	35	.1100	45	.0820	55	.0520
6	.2040	16	.1770	26	.1470	36	.1065	46	.0810	56	.0465
7	.2010	17	.1730	27	.1440	37	.1040	47	.0785	57	.0430
8	.1990	18	.1695	28	.1405	38	.1015	48	.0760	58	.0420
9	.1960	19	.1660	29	.1360	39	.0995	49	.0730	59	.0410
10	.1935	20	.1610	30	.1285	40	.0980	50	.0700	60	.0400

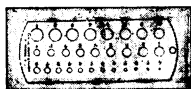
D 1005. ELLIOTT'S TAP-DRILL GAUGE.



They ARE as near perfect as the best machine practice requires, and the price is \$1.00.

They are based on threads commonly used.

No. of Screw.....	4	6	8	10	12	14	16	18	20	24
Threads to Inch.....	36	32	32	24	24	20	18	16	16	16



D 1006. JOBBERS' DRILL GAUGE.

For Gauging Twist Drills.

This Gauge is sent out finished black, but will be sent polished if desired.

No. 780. Price, each.....\$2.25

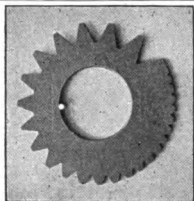
EQUIVALENTS OF SIZES IN DECIMAL PARTS OF AN INCH.

Size.	Dec.	Size.	Dec.	Size.	Dec.	Size.	Dec.	Size.	Dec.
1-16	.0625	5-32	.15625	1-4	.25	11-32	.34375	7-16	.4375
5-64	.07812	11-64	.17187	17-64	.26562	23-64	.35937	29-64	.45312
3-32	.09375	3-16	.1875	9-32	.28125	3-8	.375	15-32	.46875
7-64	.10937	13-64	.20312	19-64	.29687	25-64	.39062	31-64	.48437
1-8	.125	7-32	.21875	5-16	.3125	13-32	.40625	1-2	.50
9-64	.14062	15-64	.23437	21-64	.32812	27-64	.42187		



D 1007. NUT AND WASHER GAUGE.

For measuring diameter and thickness, also holes of nuts and washers. The figures upon one edge are for 16ths and 32ds, and on the other for 10ths and 20ths of an inch. Also U. S. Standard sizes for holes to tap for bolts. Opposite side is graduated the same as a steel rule to 32ds of an inch. No. 784. Price, each.....\$6.00



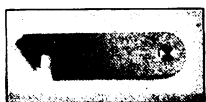
STANDARD SCREW THREAD GAUGE.

D 1008.

This Gauge is to be used as a standard for grinding tools to cut threads according to the U. S. Standard. The angles are 60 degrees and the flat surfaces at top and bottom of threads are equal to one-eighth of the pitch. Tables for screw threads, bolts and nuts, are furnished with the gauge.

Price, each\$2.00

D 1009. DEPTH OF GEAR TOOTH GAUGES.

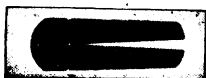


Depth of Gear Tooth Gauges for all regular pitches, from 3 to 48 pitch inclusive, are carried in stock. One gauge answers for each pitch, and indicates the extreme depth to be cut.

Price, each.....\$0.25. | Made to Order, each, \$0.75

BROWN & SHARPE'S TOOLS.

D 1020. LARGE SCREW AND WIRE GAUGE.



This Gauge, as shown in cut, is graduated on both sides of slot to show all sizes of the American standard screw gauge from 0 to 30, and is designed for the measurement of wire as well as of machine and wood screws.

The front of the gauge is graduated on both edges to 8ths of an inch. An angle cut in the side allows the head of the screw to be placed against a positive stop when measuring the length.

The back of the gauge is graduated as the old or English wire gauge, from 17 to 0000 on the right, and to 32ds of an inch on the left of slot. The outer left-hand edge is graduated to 32ds of an inch.

The larger size makes coarser graduations on the sides of the slot possible, and it is thus more easily read and is best adapted for use when it is to be kept as a tool of reference.

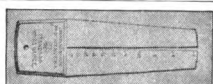
The Gauge is also made about 5-32ds thick and is known as "Extra Thick." No. 762. Price, each.....\$3.50 | No. 764. Extra Thick.....\$4.50



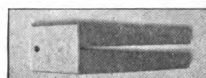
D 1021. JEWELERS' WIRE GAUGE.

These Gauges are made with reference to the wants of Manufacturing Jewelers. One edge of the angular slot is graduated into 250 parts, and

figured to give the size in thousandths of an inch. For example, a size of wire which passes down half way into the slot and stops opposite 125, is 125-1000 of an inch in diameter. The angular slot has no sharp edge to injure the stock gauged. Price, each.....\$5.00



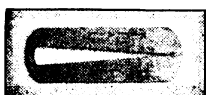
D 1022. ANGULAR WIRE GAUGES.



Dies,
Special
Shapes
and
Threads,
Made to
Order.

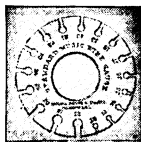
No. 752, sizes 7 to 17, American standard\$3.50
No. 754, " 15 " 28, " " 3.50
No. 756, " 25 " 40, " " 3.50
Divided with both old and new standard..... 5.00

D 1023. POCKET SCREW AND WIRE GAUGE.



This Gauge, as shown in cut, is an angular gauge graduated on the front, on the left of slot, to show all sizes of the American standard screw gauge from 0 to 30, and is designed for the measurement of wire as well as of machine and wood screws.

In addition to the gauge numbers, the front side of the gauge is also graduated on the left of slot to 32ds of an inch. The back side of gauge is graduated as the old or English wire gauge, from 17 to 0000 on the right, and the new or American wire gauge from 15 to 0000 on the left of slot. Each...\$2.50



D 1024. STEEL MUSIC WIRE GAUGE.

No. 738. Price, each.....\$1.50

In the following table, size of each number is given in decimal parts of an inch.

SIZES OF THE NUMBERS OF STEEL MUSIC WIRE GAUGE.

No. of G'uge	Size.	No. of G'uge	Size.	No. of G'uge	Size.	No. of G'uge	Size.	No. of G'uge	Size.
8-0	.0083	1	.0156	9	.0256	17	.0377	25	.0586
7-0	.0087	2	.0166	10	.027	18	.0395	26	.0626
6-0	.0095	3	.0178	11	.0284	19	.0414	27	.0658
5-0	.010	4	.0188	12	.0296	20	.0434	28	.072
4-0	.011	5	.0202	13	.0314	21	.046	29	.076
3-0	.012	6	.0215	14	.0326	22	.0483	30	.080
2-0	.0133	7	.023	15	.0345	23	.051		
1-0	.0144	8	.0243	16	.036	24	.055		

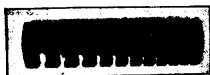
D 1025.



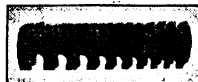
SAW GAUGE—Oblong.



Large, Nos. 0 to 36, each.....\$2.00 | Small, Nos. 1 to 26, each.....\$1.50

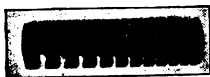


D 1036.
ROLLING MILL
GAUGES.



These Gauges are made of steel, hardened and tempered. They are about 3-16ths of an inch thick and are well adapted to the rough usage they are likely to have in rolling mills or in other places where many measurements are to be quickly taken. The sizes are those of the English or Birmingham standard gauge.

No. 744, sizes 000 to 25, each.....\$2.50 | No. 746, sizes 1 to 32, each.....\$3.00



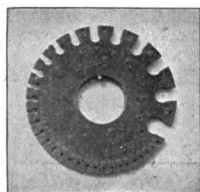
D 1037. ROLLING MILL GAUGE.

U. S. Standard Gauge for Sheet and Plate Iron and Steel. Adopted by Congress March 3, 1893.

This Gauge is about 3-16ths of an inch thick and is hardened and tempered and the sizes adjusted after hardening. Its weight and form make it especially useful in rolling mills and other places where it is likely to be subjected to rough usage.

No. 747. Price\$2.50

D 1038. B. & S. AMERICAN STANDARD WIRE GAUGE.

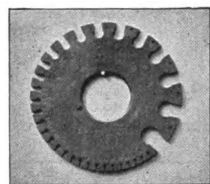


Adopted by the Brass Manufacturers, January, 1858.

To familiarize the users of the gauge with the decimal equivalents of the gauge numbers, we furnish No. 732 with these decimal equivalents, expressed in thousandths, stamped on the back, opposite to the regular gauge numbers.

No. 730. Sizes, 0 to 36. Price.....\$2.50

No. 732. Sizes, 5 to 36. Price 2.00



D 1039. U. S. STANDARD GAUGE.

This Gauge, similar to American Wire Gauge, is $3\frac{1}{4}$ inches in diameter and about $\frac{1}{8}$ inch thick. The Gauge numbers are those of the U. S. Standard Gauge for Sheet and Plate Iron and Steel, adopted by Congress, March 3, 1893.

The Gauge is hardened and tempered and all sizes are carefully tested after hardening.

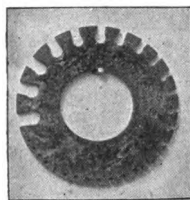
No. 740. Price\$2.50

Helmet
Bronze
Makes
Stiff
Springs.

D 1040. B. & S. ENGLISH STANDARD WIRE GAUGE.

SIZES OF THE NUMBERS OF ENGLISH STANDARD WIRE GAUGE.

The same as Stubs' Wire, or Birmingham Gauge.



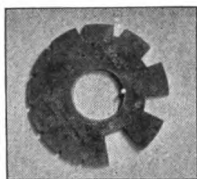
No. of Wire Gauge.	Size of each No. in dec. parts of an inch.	No. of Wire Gauge.	Size of each No. in dec. parts of an inch.	No. of Wire Gauge.	Size of each No. in dec. parts of an inch.	No. of Wire Gauge.	Size of each No. in dec. parts of an inch.
0000	.454	7	.180	17	.058	27	.016
000	.425	8	.165	18	.049	28	.014
00	.380	9	.148	19	.042	29	.013
0	.340	10	.134	20	.035	30	.012
1	.300	11	.120	21	.032	31	.010
2	.284	12	.109	22	.028	32	.009
3	.259	13	.095	23	.025	33	.008
4	.238	14	.083	24	.022	34	.007
5	.220	15	.072	25	.020	35	.005
6	.203	16	.065	26	.018	36	.004

No. 734. Sizes 1 to 36.....\$2.00 | No. 736. Sizes 6 to 36.....\$1.50

The Stubs' Iron Wire Gauge is the one commonly known as the English Standard Wire, or Birmingham Gauge, and designates the Stubs' *soft* wire sizes.

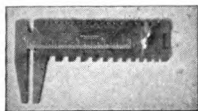
The Stubs' Steel Wire Gauge is the one that is used in measuring drawn steel wire or drill rods of Stubs' make, and is also used by many makers of American drill rods.

For Table of Decimal Equivalents of Stubs' Steel Wire Gauge, see back of book.

**D 1051. WORM THREAD TOOL GAUGE.**

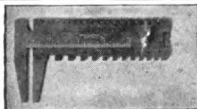
This Gauge furnishes the correct form for tools used in turning the threads of worms, when the worm wheels are cut with involute cutters. The figures on the gauge correspond to the number of threads per inch of the worm. The slots in the gauge are also of the proper depth for their respective threads.

Price, each.....\$2.50

**D 1052. WIRE GAUGE AND CALIPER.**

Tongue graduated on both sides. For store use in selecting iron, steel and sheet stock, also for iron and steel rollers' use.

No. 728. Price\$7.00

**D 1053. WIRE GAUGE AND CALIPER.**

U. S. Standard Sheet and Plate Iron and Steel.

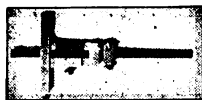
This Gauge and Caliper is 5 3/4 inches long and 3-16 inches thick. The jaws are 2 inches deep. The tongue is graduated to 32ds of an inch on both sides, and can be drawn out to measure 4 inches. The Gauge numbers are those of the U. S. Standard Sheet and Plate Iron and Steel, adopted by Congress, March 3, 1893.

No. 729. Price\$7.00

**D 1054. BOILER PLATE GAUGE.**

This Gauge is used by boiler-makers, United States steamboat inspectors and others, for measuring boiler plate. It is similar to the 4 inch Caliper Square. The jaws are 1 inch long, hardened

and ground, and are cut out on the inside somewhat like those of the Pocket Vernier Caliper, page 133. | No. 710. Price\$6.00

**D 1055. DEPTH GAUGE.**

This Depth Gauge is used in obtaining the depth of holes, recesses in dies, distance from a plane surface to a projection, etc. The blade is 5 inches long, 1/4 inch wide, allows of measurements to 3 3/4 inches being made, and is graduated on the front to read, by means of a vernier, to thousandths of an inch; the back of blade is graduated to 64ths of an inch.

No. 714. Price, each, in Morocco case\$10.00

D 1056. 6 INCH RULE DEPTH GAUGE.

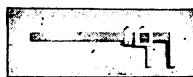
The cut shows the head and a portion of the blade of a 6-inch Rule Depth Gauge.

The head is of a form convenient for holding when in use. It is made of steel 1/8 inch thick, hardened.

The blade is a 6-inch narrow tempered steel rule. The head and blade together make a very durable Depth Gauge.

The blade sent with the Gauge is divided into 64ths and 100ths of inches. We can furnish blades divided into 32ds and 64ths, or 50ths and 100ths of inches, if desired.

No. 715. Price.....\$1.25 Taps and Dies Made to Any Degree of Accuracy.

**D 1057. HEIGHT GAUGE.**

This Height Gauge is used for obtaining the height of projections from a plane surface, or the location of bushings in jigs, etc. The bar is 10 inches long, admits of measurements to 8 inches in height being made and is graduated to read, by means of a vernier, to thousandths of an inch. The jaws are 2 inches long and 1/8 inch wide when closed. The fixed jaw is 3/8 inch thick, allowing Gauge to stand upright.

No. 720. Price, each, in Morocco case.....\$25.00

**D 1058. SCREW PITCH GAUGE.**

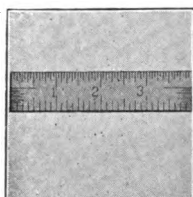
This Screw Pitch Gauge, similar in design to the No. 20 Screw Pitch Gauge, page 122, is designed especially for Bicycle manufacturers, Electricians and others using screws with fine threads.

The Gauge contains 22 blades with the pitches 32, 34, 36, 38, 40, 42, 44, 46, 48, 50 and 52 on one end, and 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, on the other. No. 22. Price.....\$1.00

D 1069. BROWN & SHARPE'S STANDARD STEEL RULES.

No.	Price.	L'gth	No. Graduations	No.	Price.	L'gth	No. Graduations
100	\$0.15	1 in.	4 or 7	114	\$2.50	12	5
102	.25	2 "	4, 7 or 9	116	2.00	18	1, 2, 4, 6 or 7
104	.35	3 "	1, 2, 4, 6 or 7	118	2.75	24	1, 2, 4, 6 or 7
106	.45	4 "	1, 2, 4, 6 or 7	120	5.00	24	5
108	.65	6 "	1, 2, 4, 6 or 7	122	7.00	36	1, 2, 4, 6 or 7
110	1.00	9 "	1, 2, 4, 6 or 7	124	10.00	48	1, 2, 4, 6 or 7
112	1.25	12 "	1, 2, 4, 6 or 7				

These Rules are divided in parts of inches as follows:



No. 1 Graduation.	No. 2 Graduation.	No. 4 Graduation.	
1st cor. 10, 20, 50, 100	8	8	
2d " 12, 24, 48	10, 20, 50, 100	16	Gardner
3d " 14, 28	12, 24, 48	32	Opening
4th " 16, 32, 64	16, 32, 64	64	Die
			Head
			Cuts
			Exact
			Threads

No. 5 Graduation.

1st cor. 11, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25	
2d " 16, 32, 64	
3d " 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38	
4th " 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 100	

No. 6 Graduation.

1st cor. 32
2d " 48
3d " 50
4th " 64

No. 7 Graduation.

16
32
64
100

No. 9 Graduation.

10, 20
16
32, 64
50, 100

No. 10 Graduation.

1st cor. 32
2d " 64

No. 11 Graduation.

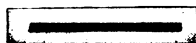
64
100

No. 12 Graduation.

50
100

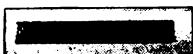
D 1070. NARROW STEEL RULE.

We carry in stock a steel rule, not tempered, 6 inches long, about 11-16 inches wide, and furnish it with Nos. 1, 2, 4, 6 or 7 graduation. This rule corresponds to the Standard Steel Rule, but is lighter. No. 130. Price.....\$0.65

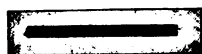


D 1071. TEMPERED STEEL RULES.

These Rules are about 1-20 inches thick. Every Rule is marked "Tempered."



No.	Price.	L'gth	App'ox. Width.	No. of Graduations	No.	Price.	L'gth	App'ox. Width.	No. of Graduations
139	\$0.45	4 in.	19-32 in.	1, 2, 4, 6 or 7	143	\$2.00	18 in.	1 in.	1, 2, 4, 6 or 7
140	.65	6 "	11-16 "	"	144	2.75	24 "	" "	"
141	1.00	9 "	53-64 "	"	145	7.00	36 "	" "	"
142	1.25	12 "	31-32 "	"					



D 1072. NARROW TEMPERED STEEL RULES.

Every Rule is marked "Tempered." These Rules are about 1-20 inch thick and about 7-32 inch wide and graduated on one corner of each side only.

No.	Price.	Length.	No. of Graduations.
157	\$0.45	4 inches.	10, 11 or 12
158	.65	6 "	"



D 1073. FLEXIBLE STEEL RULES.

Every Rule is marked "Tempered." Graduated on one side only.

No.	Price.	L'gth	App'ox. Width.	No. of Graduations	No.	Price.	L'gth	App'ox. Width.	No. of Graduations
149	\$0.45	4 in.	1-2 in.	10, 11 or 12	153	\$2.00	18 in.	3-4 in.	10, 11 or 12
150	.65	6 "	"	"	154	2.75	24 "	"	"
151	1.00	9 "	"	"	155	7.00	36 "	"	"
152	1.25	12 "	"	"					



BROWN & SHARPE'S SQUARE STEEL RULES. D 1084.

No.	Price.	Length.	Number of Graduations.	These Rules are divided in parts of inches as follows :
230	\$0.45	3 inches.	15, 16 or 17	
232	.60	4 "	15, 16 or 17	
234	.90	6 "	15, 16 or 17	

No. 15 Graduation.

1st corner 8

2d corner 16

3d corner 32

4th corner 64

No. 16 Graduation.

16

32

64

100

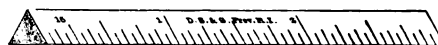
No. 17 Graduation.

16

50

64

100



D 1085. TRIANGULAR STEEL RULES.

No.	Price.	Length.	Number of Graduations.	These Rules are divided in parts of inches as follows :
240	\$0.50	3 inches.	20, 21 or 22	
242	.70	4 "	20, 21 or 22	
244	1.00	6 "	20, 21 or 22	
246	2.00	12 "	20, 21 or 22	

No. 20 Graduation.

1st corner 16

2d corner 64

3d corner 100

No. 21 Graduation.

16

32

64

No. 22 Graduation.

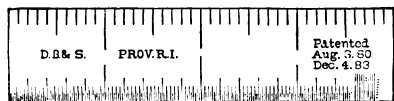
12, 24, 48

20, 50, 100

16, 32, 64

Malleable
Thumb
Screws
Carried in
Stock.

D 1086. IMPROVEMENT IN STANDARD STEEL RULES.



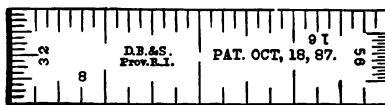
The improvement consists in making in a scale of hundredths (preferably near the end), nine spaces of eleven-thousandths (11-1000) of an inch each, and a diagonal line of points or dots, the point nearest the

edge of the rule being twelve thousandths from the last line, the second point thirteen thousandths, and so on, each point being one-thousandth of an inch farther from the line than the point preceding it.

By the addition of the nine (11-1000) spaces measurements can be made and dividers set by thousandths of an inch, from one-tenth of an inch to any length on the scale of hundredths; and with the addition of the nine (11-1000) spaces and line of points, dividers can be set by thousandths, from one-hundredth of an inch to any part of the scale.

EXAMPLES: To set dividers thirteen-thousandths of an inch, place one point of the dividers in the second dot and the other point in the last line. To get 75-1000, take two hundredths and five of the (11-1000) spaces. To get one inch and one thousandth, take ninety-nine hundredths and one of the (11-1000) spaces. To get 575-1000, take fifty-two hundredths and five of the (11-1000) spaces.

D 1087. STANDARD STEEL RULES.—With Patent End Graduations.



These Rules are made to specific widths and the ends are graduated on one side to 48ths and 100ths and on the other side, as shown in the cut, to 32ds and 56ths of an inch. The 32ds extend entirely across the rule. The 3-inch Rules are graduated to 40ths instead of 100ths on the end.

These Rules are furnished with No. 4 graduation only.

No.	Price.	Length.	Width.	No.	Price.	Length.	Width.
160	\$0.25	2 in.	$\frac{1}{2}$ in.	166	\$0.65	6 in.	1 in.
162	.35	3 "	$\frac{3}{8}$ "	168	1.00	9 "	1 "
164	.45	4 "	$\frac{3}{4}$ "	170	1.25	12 "	1 "

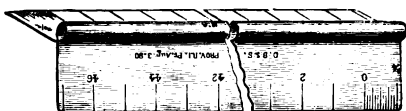
D 1088. STANDARD STEEL RULES.—Metric Measure.

No. 180. 5 centimeters.....\$0.45 | No. 182. 10 centimeters.....\$0.85
First cor. graduated to 1-5 m.m., the remaining cors. to 1 m.m.

No. 184. 20 centimeters.....\$1.75 | No. 186. 30 centimeters.....\$2.50
Five centimeters of first cor. graduated to 1-5 m.m., the remainder of that cor. together with the remaining cors. graduated to 1 m.m.

No. 188. 50 centimeters.....\$4.00 | No. 190. 1 meter.....\$10.00
Five centimeters on each end of first cor. graduated to 1-5 m.m., the remainder of that cor. together with the remaining cors. graduated to 1 m.m.

D 1099. IMPROVED SCALES FOR DRAUGHTSMEN.



Though designed more particularly for draughtsmen, the form of these scales makes them very convenient for many other purposes. Those we have in stock are made of steel, nickel plated; a 12 inch scale weighs but $2\frac{1}{2}$ oz. Each scale has one kind of graduation, the same on both sides, or two kinds, one on each side. This relieves the draughtsmen from the constant care and loss of time required to avoid using the wrong graduation, when there are many kinds on the scale.

LIST OF SCALES FOR ARCHITECTS.

ONE GRADUATION. TWELVE INCHES LONG.

No. 275.	3	inch—1 foot.	No. 279.	3-4	inch—1 foot.
No. 276.	2	" —1 "	No. 280.	1-2	" —1 "
No. 277.	1	1-2 " —1 "	No. 281.	1-4	" —1 "
No. 278.	1	" —1 "	No. 282.	1-8	" —1 "

SIX INCHES LONG.

No. 285.	1-2	inch—1 foot.	No. 288.	1-8	inch—1 foot.
No. 286.	1-4	" —1 "	No. 289.	3-32	" —1 "
No. 287.	3-16	" —1 "			

Price, 6 inch scales.....\$1.00 | Price, 12 inch scales.....\$1.25

TWO GRADUATIONS. TWELVE INCHES LONG.

No. 290.	3	in. and 1	1-2 in.—1 ft.	No. 296.	3-8	in. and 3-16	in.—1 ft.
No. 292.	1	" " 1-2	" —1 "	No. 298.	1-4	" " 1-2	" —1 "
No. 294.	3-4	" " 1-2	" —1 "	No. 300.	1-4	" " 1-8	" —1 "

Special Scales made to order.

Price, 6 in. scales.....\$2.00 | Price, 12 inch scales.....\$2.50

LIST OF SCALES FOR ENGINEERS.

ONE GRADUATION. TWELVE INCHES LONG.

No. 302.	20ths	of an inch.	No. 308.	60ths	of an inch.	Malleable
No. 304.	40ths	" "	No. 310.	80ths	" "	Thumb
No. 306.	50ths	" "	No. 312.	100ths	" "	Nuts
						Carried in
						Stock.

DECIMAL PARTS OF A FOOT.

No. 320.	1-200th	of a foot.	No. 323.	1- 500th	of a foot.
No. 321.	1-250th	" "	No. 324.	1- 800th	" "
No. 322.	1-400th	" "	No. 325.	1-1000th	" "

TWO GRADUATIONS. TWELVE INCHES LONG.

No. 327.	10ths and 50ths	of an inch.	No. 332.	40ths and 50ths	of an inch.
No. 328.	20ths " 30ths	" "	No. 333.	40ths " 60ths	" "
No. 329.	20ths " 50ths	" "	No. 334.	40ths " 80ths	" "
No. 330.	20ths " 80ths	" "	No. 335.	40ths " 100ths	" "
No. 331.	40ths " 30ths	" "			

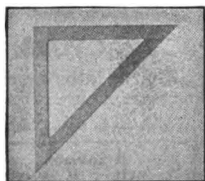
Price, 6 inch scales.....\$1.00 | Price, 12 inch scales\$1.25

MISCELLANEOUS.

- No. 340. 12 inch, graduated on one side to 1-16 inch, other side, 1-32 inch.
- No. 341. 12 inch, " on one side to 1-64 inch, other side, 1-100 inch.
- No. 342. 12 inch, " both sides to 1-100 inch.
- No. 344. 6 inch, " on one side to 1-16 inch, other side, 1-32 inch.
- No. 346. 6 inch, " both sides to 1-100 inch.
- No. 348. 12 inch, " to 32ds, 1-2 inch—1 inch.
- No. 350. 12 inch, " on one side to 10ths (100ths last three inches), other side to 12ths (48ths last three inches).

No. 356. 12 inch Special Scale, 2 inch—1 foot.

It is graduated on both sides alike, and figured from the same end. It is divided into 12ths of an inch, figured every 6th of an inch, and the first 1-6 on each side is divided into 8 parts.



D 1100.

OPEN STEEL TRIANGLES—For Draughtsmen

No.	Price.	Angles.	Length Sides.	Width of Sides.
540	\$4.00	30°, 60°, 90°	6", 10 3-8", 12"	3-4"
542	3.00	30°, 60°, 90°	3 1-2", 6 1-16", 7"	5-8"
544	4.00	45°, 45°, 90°	8", 8", 11 1-4"	3-4"
546	3.00	45°, 45°, 90°	5", 5", 7 1-16"	5-8"

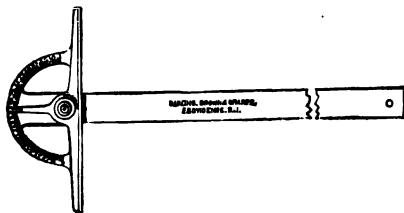
BROWN & SHARPE'S TOOLS.**D 1111. DRAUGHTSMEN'S PROTRACTOR.**

This Protractor can be quickly set to any angle. It can be used either side up and on either of the two straight edges, and it is of advantage in dividing a circle, transferring angles or laying off a given angle, without resetting, on either side of a line.

It forms a convenient extension to a T Square, and frequently takes the place of 45 and 60-degree triangles.

Vernier reads to five minutes.

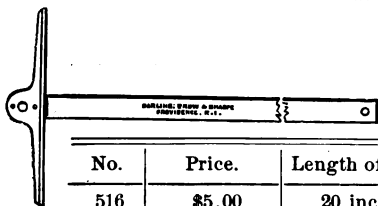
No. 530. Price, each.....\$6.50 | In Morocco case.....\$7.75
For Tables for use with Draughtsmen's Protractor, see back of book.

D 1112.**DRAUGHTSMEN'S T SQUARE—Bronze Head.**

This Draughtsman's T Square has a steel blade 36 inches long, 1 1-4 in. wide and 3-64 in. thick.

The head is of bronze and is 9 in. long. The arc is 4 1-2 in. in diameter and graduated to 1-2 deg.

No. 512. Price, each.....\$10.00

D 1113.**DRAUGHTSMEN'S T SQUARES.**

These Draughtsman's T Squares have steel blades and cast iron heads.

No.	Price.	Length of Blade.	Width of Blade.	Length Head.
516	\$5.00	20 inches.	1 inch.	8 inches.
518	6.00	24 "	1 "	8 "
520	7.00	36 "	1 1/4 "	8 "
522	9.00	36 "	1 1/4 "	10 "

**TRIANGULAR BOXWOOD SCALES.****D 1114.**

We Cut
Sheet
Brass
Special
Sizes to
Order.

Nos. 63, 64 and 65, for Architects and Mechanical Draughtsmen.

No. 63. Triangular Boxwood Scale, 24 inches, divided to scales of 1-8, 1-4, 3-8, 3-4, 1-2, 1, 1 1-2, 3, 2 and 4 inches to the foot and 16ths of an inch. Price.....\$5.00.

No. 64 B. Triangular Boxwood Scale, 12 inches, ditto, with 3-16 and 3-32, instead of 2 and 4 inches to the foot. Price.....2.00

No. 65. Triangular Boxwood Scale, 6 inches, ditto. Price.....1.50

No. 72. Triangular Boxwood Scale, 24 inches, on one edge to 10ths, 20ths, 30ths, 40ths, 50ths, 60ths of an inch. Price.....5.00

No. 73 B. Triangular Boxwood Scale, 12 inches, ditto. Price.....2.00

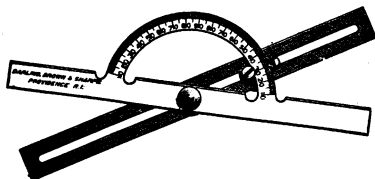
No. 75. Triangular Boxwood Scale, 6 inches, ditto. Price.....1.50

Nos. 72 M and 73 M are divided either 10 to 60 or 20 to 80.

Nos. 72, 73 and 75, for Railroad Engineers and Land Surveyors.

D 1115.**BEVEL PROTRACTORS.**

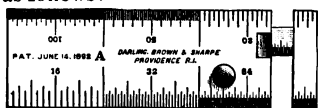
The half circle is divided into degrees.



No.	Price	L'gth of Sliding Arm.
490	\$4.50	6 inches.
492	5.75	10 "

D 1126. STEEL CALIPER RULES.

These Rules are 3 inches long when closed and $\frac{1}{8}$ inch thick. The Slide can be drawn out to measure $2\frac{1}{2}$ inches. They are divided to parts of an inch as follows:



	A	B	C	D
1st cor.	8, 14, 28	8, 14, 28	8	8
2d cor.	12, 24, 48	12, 24, 48	16	16
3d cor.	16, 32, 64	16, 32, 64	32	32
4th cor.	20, 50, 100	20, 50, 100	64	64
Slide...	64 & 32	64 & 100	32 & 64	64 & 100

No. 360. Price.....\$2.00

D 1127. BUTTON GAUGE.

This differs from the Steel Caliper Rule, No. 360, only in that the outside is graduated to 16ths, 20ths, 32ds and 40ths of an inch and the slide to 40ths and 80ths of an inch. No. 394.....\$2.00

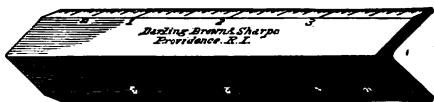
D 1128. 4-INCH CALIPER RULE.

We now make a 4-inch Caliper Rule similar to No. 360. The slide can be drawn out to measure 3 inches and can be held at any point by the clamp screw. This Caliper Rule is furnished with A, B, C and D graduations.

No. 361. Price.....\$2.50

D 1129. KEY SEAT RULES.

Parallel lines for key seats, mortises, etc., can be readily and accurately drawn with these rules on shafts not less than $\frac{1}{8}$ inch in diameter. The edges are beveled. One edge is graduated into 16ths, and the other into 32ds of an inch.



No.	Price.	Length.
254	\$2.50	4 inch.
256	3.00	6 "
258	3.75	8 "

D 1130. STANDARD STEEL STRAIGHT EDGES.

No.	Price.	Length.	Width.	No.	Price.	Length.	Width.
370	\$0.60	6 in.	1 in.	380	\$ 6.00	36 in.	2 $\frac{3}{8}$ in.
372	.90	9 "	1 $\frac{1}{8}$ "	382	9.00	48 "	3 "
374	1.20	12 "	1 $\frac{3}{8}$ "	384	12.00	60 "	3 "
376	1.80	18 "	1 $\frac{5}{8}$ "	386	16.00	72 "	3 "
378	2.40	24 "	2 "				

Try our
Brush
Copper for
Electrical
Work.

D 1131. BEVELED STEEL STRAIGHT EDGES.

The beveled edge is 1-16 inch thick. Only one edge is beveled.

No.	Price.	Length.	Width.	No.	Price.	Length.	Width.
400	\$2.00	12 in.	1 $\frac{3}{8}$ in.	406	\$ 9.00	36 in.	3 in.
402	3.00	18 "	1 $\frac{5}{8}$ "	408	12.00	48 "	3 "
404	4.00	24 "	2 "				

D 1132. HARDENED STEEL STRAIGHT EDGES.

These Straight Edges are like the tongues of the Hardened Steel Try Squares, and are hardened on the edges only.

No.	Price.	Length.	Width.	No.	Price.	Length.	Width.
420	\$0.60	3 $\frac{3}{8}$ in.	$\frac{7}{8}$ in.	430	\$ 3.50	17 in.	2 $\frac{1}{4}$ in.
422	1.00	5 $\frac{1}{8}$ "	1 $\frac{1}{8}$ "	432	4.50	20 "	2 $\frac{3}{4}$ "
424	1.25	7 "	1 $\frac{3}{8}$ "	434	7.00	27 "	3 "
426	2.00	10 $\frac{3}{4}$ "	1 $\frac{5}{8}$ "	436	9.00	33 "	3 "
428	3.00	14 "	2 "	438	12.00	39 "	3 $\frac{1}{2}$ "

D 1133. DRAUGHTSMEN'S STEEL STRAIGHT EDGES.

No.	Price.	Length.	Width.	No.	Price.	Length.	Width.
450	\$0.90	15 in.	1 $\frac{1}{4}$ in.	458	\$3.00	36 in.	2 in.
452	1.00	18 "	1 $\frac{1}{2}$ "	460	4.00	42 "	2 $\frac{1}{4}$ "
454	1.50	24 "	1 $\frac{3}{4}$ "	462	6.00	48 "	2 $\frac{3}{4}$ "
456	2.25	30 "	1 $\frac{7}{8}$ "	464	8.00	60 "	2 $\frac{7}{8}$ "

D 1144.

TRIANGULAR METALLIC SCALES.

These Patent Triangular Metallic Scales are of the size and shape of the common 12 inch Triangular

Boxwood Scales. They are made from brass tubing with the ends closed, nickeled, with a dull finish and weigh less than 3 1-2 ounces.

The liability of the wood scales to crack, warp or twist, the chipping of their edges, and their variation from standard measurement, are well known to all who have used them. These objections we have overcome in the new scales. The ends of these scales are covered with hardened steel plates which slightly raise the scales from the paper.

No. 64 M. 12 inches, divided to scales of 3-16, 3-32, 1-8, 1-4, 3-8, 3-4, 1-2, 1, 1 1-2 and 3 inches to the foot and 16ths of inches. Price, each \$2.50

No. 73 M. 12 inches, divided on one edge each to 10ths, 20ths, 30ths, 40ths, 50ths and 60ths of inches; or to 20ths, 30ths, 40ths, 50ths, 60ths and 80ths of inches. Price, each 2.50

In ordering No. 73 M, state whether the divisions 10 to 60 or 20 to 80 are wanted.

D 1145.

STEEL GEAR RULES.

For Use
Tables,
Back of
Book.

No. 61. This Rule is 12 inches long and is divided into 18, 20, 22, 24, 26, 28, 30, 32 parts of an inch whole length. Price \$3.00

No. 78. This Rule is 12 inches long and is divided into 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38 parts of an inch, one inch of each division. Price 3.00

The Rules Nos. 114 and 120 can also be used for sizing gears.

D 1146.

STEEL SHRINK RULES.

This Rule is $2\frac{1}{4}$ inches long and is graduated as a Shrink Rule on one side and a Standard Rule on the other side. Both sides are graduated as follows :

No. 200. The first corner is graduated into 10, 20, 50, 100, 12, 24, 48, and the second corner into 16, 32, 64 parts of an inch. Price \$5.00

No. 202. This Rule is $2\frac{1}{4}$ inches long and is graduated as a Shrink Rule on both sides. It has No. 1 graduation. Price 5.00

D 1147.

BOXWOOD SHRINK RULE.

No. 210. This Rule is $2\frac{1}{4}$ inches long and is graduated as a Shrink Rule on both sides. It has No. 1 graduation. Price \$3.00

D 1148.

STANDARD STEEL YARD MEASURE.

No. 215. This Measure is 1 inch wide, 1-8 inch thick. It is divided into inches and 1-8ths of an inch on one side and into 1-16, 1-8, 1-4, 3-8, 1-2, 5-8, 3-4 and 7-8 of a yard on the other side. Price \$3.00

D 1149.

LADIES' WORK BASKET RULE.

No. 220. This Rule is 6 inches long, 1 inch wide and 1-40 inch thick, made of steel and nickel plated. It is light and serviceable, and is graduated in the manner found most convenient for ladies' use. The graduations on each side are figured from the same end. It is graduated on one side to 8ths and on the other to 8ths and 16ths of an inch \$0.50

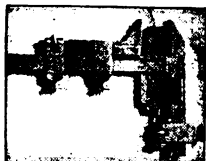


D 1150.

LATHE TEST INDICATOR.

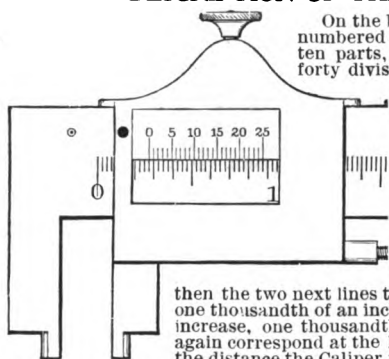
The Lathe Test Indicator is new in design and is for use in setting centrally, any point or hole in a piece of work to be operated upon in a lathe or upon a face plate. It is also well adapted for testing lathe centers, shafting, or other work held between centers, the inside or outside of cylinders, pulleys, etc., and all work of a similar class. The tool is made of steel, and is of such a size as to be held conveniently in the tool post of a lathe. The bar, 15-16 inch wide and 3-8 inch thick, is drop forged and formed at the end to receive a Universal Joint for supporting the finger holder. The Universal Joint recommends itself by its simplicity of construction. A clamp nut is provided for clamping the joint when it is desired to have only a vertical movement to the finger, as in testing pieces held between centers, the inside or outside of pulleys, etc. The bushing, which holds the finger, is split, thus allowing the finger to be adjusted to lengths required, and clamped in position. The bar and all wearing parts are carefully hardened. The finger holder is furnished with two fingers, either one of which can be quickly attached; one finger is ground to an angle of 60 degrees and the other is bent for inside and outside testing. A spiral spring is provided for holding the finger against the work with an even pressure. Each tool is neatly packed in a box fitted to receive the various parts.

Price \$3.00

**D 1161. GEAR TOOTH CALIPER.**

This Caliper is for the purpose of accurately measuring the distance from top to pitch line, and thickness at pitch line, of gear teeth not coarser than 2 diametral pitch. The sliding jaw moves upon a bar graduated to read, by means of a vernier, to thousandths of an inch. A tongue, moving at right angles with the jaws, is graduated in

the same manner. Both the sliding jaw and tongue are provided with adjusting screws. | No. 670. Price.....\$25.00

D 1162. DESCRIPTION OF THE VERNIER AND ITS USE.

On the bar of the instrument is a line of inches numbered 0, 1, 2, etc., each inch being divided into ten parts, and each tenth into four parts, making forty divisions to the inch. On the sliding jaw is a line of division (called a Vernier, from the inventor's name) of twenty-five parts, numbered 0, 5, 10, 15, 20, 25. The twenty-five parts on the Vernier correspond, in extreme length, with twenty-four parts, or twenty-four fortieths of the bar, consequently each division on the Vernier is smaller than each division on the bar by one thousandth part of an inch. If the sliding jaw of the Caliper is pushed up to the other, so that the line marked 0 on the Vernier corresponds with that marked 0 on the bar,

then the two next lines to the right will differ from each other by one thousandth of an inch, and so the difference will continue to increase, one thousandth of an inch for each division, till they again correspond at the line marked 25 on the Vernier. To read the distance the Caliper may be open. Commence by noticing how

many inches, tenths and parts of tenths, the zero point on the Vernier has been moved from the zero point on the bar. Now count upon the Vernier the number of divisions, until one is found which coincides with one on the bar, which will be the number of thousandths to be added to the distance read off on the bar. The best way of expressing the value of the divisions on the bar, is to call the tenths one hundred thousandths (.100), and the fourths of tenths, or fortieths, twenty-five thousandths (.025). Referring to above cut, it will be seen that the jaw is open two-tenths and three-quarters, which is equal to two hundred and seventy-five thousandths (.275). Now suppose the Vernier was moved to the right so that the tenth division should coincide with the next one on the scale, which will make ten-thousandths (.010) more to be added to two hundred and seventy-five thousandths (.275), making the jaws to be open two hundred and eighty-five thousandths (.285).

In making inside measurements with the 6" Vernier and the Pocket Vernier Calipers, two and one-half tenths or two hundred and fifty thousandths (.250) of an inch and with the 12" and 24" Verniers, three-tenths or three hundred thousandths (.300) of an inch should be added to the apparent reading on the Vernier side for the space occupied by the caliper points. When the other side of the instrument is used, no deduction is necessary, as there are two lines, one indicating inside and the other outside measurements.

D 1163. POCKET VERNIER CALIPER.

This Pocket Vernier Caliper is graduated on the front to read, by means of a vernier, to thousandths of an inch. It is graduated on the back to 64ths of an inch.

The jaws are of steel, hardened and ground, are $\frac{3}{4}$ inch long, $\frac{1}{4}$ inch wide when closed, and take inside as well as outside measurements. The Caliper measures to 1 11-16 inch outside diameter. This Caliper is furnished graduated to millimeters in place of 64ths of an inch, with a vernier to read to 50ths of a millimeter. An explanation of the vernier is sent with each Caliper.

No. 680. Price.....\$10.00 | In Morocco case.....\$10.50

**D 1164. VERNIER CALIPERS.**

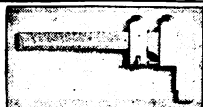
These Calipers are graduated on the front to read, by means of a vernier, to thousandths of an inch. They are graduated on the back to 64ths of an inch. The jaws are hardened and ground and take inside as well as outside measurements. Points are placed on the bars and sides so that dividers can be set to transfer distances.

These Calipers are furnished graduated to millimeters, in place of 64ths of an inch, with verniers to read to 50ths of a millimeter.

An explanation of the vernier is sent with each Caliper.

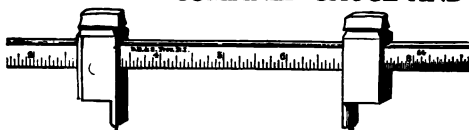
Number.	Morocco Case. Price in	Size.	Width of Jaws Closed.	Length of Jaws.
682.....	\$15.00	6 inch.	1-4 inch.	1 1-4 inch.
684.....	20.00	12 "	3-10 "	1 3-4 " "Special
686.....	25.00	12 "	3-10 "	2 1-4 " "Drills,
688.....	25.00	24 "	3-10 "	1 3-4 " "Made to

A standard for testing the accuracy of the Calipers: Price, \$3.00.

**D 1175. CALIPER SQUARES.**

These Caliper Squares are graduated on one side to 64ths and on the other side to 100ths of an inch. They are furnished with and without adjusting screws. The 4 inch, 6 inch and 9 inch Caliper Squares take inside as well as outside measurements. The 4 inch Caliper Square is also made graduated to read to 1-5 m. m. instead of 64ths of an inch. The 6 and 9 inch Caliper Squares have hardened jaws.

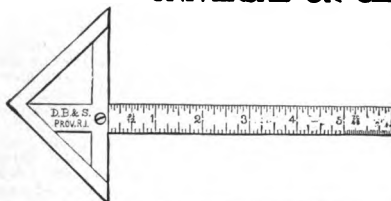
No.	Price without Adjusting Screw.	Price with Adjusting Screw.	Size.	Length of Jaws.	Width of Jaws Closed
700	\$2.25	\$3.50	2 in.	3-4 inch.	
702	3.50	4.50	4 "	1 1-2 "	1-2 inch.
704	5.50	7.50	6 "	2 "	1 "
706	9.00	11.00	9 "	3 1-4 "	1 "

D 1176. COMBINED GAUGE AND CALIPER.

This tool combines Dividers, inside and outside Calipers, and a graduated double Scratch Gauge. It will caliper a round bar two inches in diameter. The beam is 12 inches long, $\frac{1}{2}$ inch wide, $\frac{3}{8}$

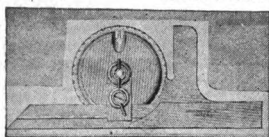
inch thick, and is graduated to 16ths, 32ds and 64ths of an inch.

No. 610. Price.....\$5.00

D 1177. UNIVERSAL OR CENTER SQUARES.

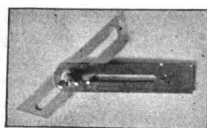
The Universal or Center Squares have blades graduated on one side. The 4 inch blade is graduated to 20ths on one corner and to 32ds of an inch on the other corner. The 6 inch, 8 inch, 10 inch and 12 inch blades are graduated to 12ths and 48ths on one corner and to 16ths and 32ds of an inch on the other corner.

No.	Price.	L'gth of Blade.	L'gth of Head.	The length of blade as given is the length from the head to the end of blade.	Special Taps Made to Order.
650	\$2.00	4 inch.	3 inch.		
652	2.50	6 "	4 "		
654	3.50	8 "	5 1-2 "		
656	5.00	10 "	7 "		
658	6.00	12 "	8 3-4 "		

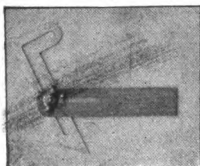
D 1178. UNIVERSAL BEVEL PROTRACTOR.

ship, throughout, of the best, very accurate measurements can be obtained.

The Dial is graduated, in degrees, the entire circle, but $\frac{1}{2}$ and $\frac{1}{4}$ degrees can be easily estimated, and when set can be rigidly clamped by the thumb nut shown in cut. The blade is 6 inches long, about $\frac{1}{8}$ inch thick, can be drawn out to its full length and clamped in any position desired. | Price.....\$8.00

D 1179. UNIVERSAL BEVELS.

No.	Price.	Length of Head and Tongue.	Width of Head and Tongue.
480	\$1.25	3 inch.	$\frac{5}{8}$ inch.
482	1.25	1 $\frac{1}{4}$ "	$\frac{3}{4}$ "

**D 1180. IMPROVED UNIVERSAL BEVEL.**

The cut represents an Improved Universal Bevel 3 inches long, with an offset blade that admits of the measurement of all angles.

The case is solid on the top for 1 $\frac{1}{2}$ inches from the square end. No. 483. Price.....\$1.50

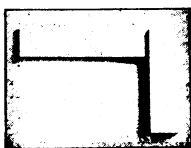
D 1191. HARDENED CAST STEEL TRY SQUARES.

The length of blade as given is from the inner edge of the beam to end of blade.

No.	Price.	Length of Blade.	Length of Beam.
550	\$2.00	1 1-2 inch.	1 9-16 inches.
552	3.00	3 "	2 7-16 "
554	4.00	4 1-2 "	3 9-16 "
555	5.00	6 "	4 3-8 "
556	7.00	9 "	5 5-8 "
557	10.00	12 "	7 1-8 "
558	15.00	15 "	8 3-16 "
560	18.00	18 "	10 1-4 "

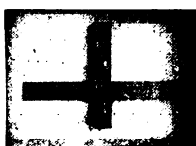
D 1192. IMPROVED HARDENED CAST STEEL TRY SQUARES.

This improvement in making large Try Squares consists in securing the blade to the beam by means of screws, whereby they are made more permanent and accurate and can be more readily and economically repaired. The length of blade, as given, is from the inner edge of beam to end of blade.



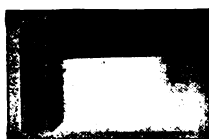
The Screws should be adjusted only at our works.

No.	Price.	Length of Blade.	Length of Beam.
570	\$30.00	24 inch.	13 1-8 inch.
572	40.00	30 "	16 1-4 "
574	50.00	36 "	19 1-2 "

**HARDENED CAST STEEL T SQUARE
D 1193. AND UNIVERSAL BEVEL.**

The beam is 5 inches long. The tongue is 8 inches long. Both parts are hardened and ground. The tongue can be used at the extreme end of the beam. The thick edge of the three-cornered washer should be placed next to the end of the beam.

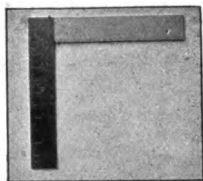
No. 584. Price.....\$5.00

D 1194. GRADUATED STEEL SQUARES.—Not Hardened.

No.	Price.	Length of Blade.	Length of Beam.
590	\$2.00	3 inch.	2 inch.
592	2.50	4 "	2 9-16 "
594	3.50	6 "	3 3-4 "
596	6.00	9 "	5 "
598	7.00	12 "	6 1-16 "

The length of blade, as given, is the extreme length over all.

Helmet Oil
Lubricates
Anything.

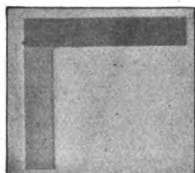
**D 1195. STEEL SQUARE FOR MILLWRIGHTS.**

This Square is designed to meet the wants of those desiring a more accurate tool than the ordinary carpenter's square.

Long blade, 24 inches long, 2 inches wide.

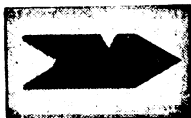
Short " 18 " " 1 1-2 " "

Both blades are 5-32 inch thick at the corner where they unite, and taper down to 1-16 inch at their ends. Both sides are divided to 8ths, 16ths, 32ds and 64ths of an inch. | No. 620. Price.....\$10.00

D 1196.**THIN STEEL SQUARES.**

No.	Price.	Length of Blades.	Width of Blades.
630	\$1.00	2 inches.	1-2 inches.
632	1.50	3 "	5-8 "
634	2.00	4 "	3-4 "
636	3.00	6 "	1 "
638	4.00	8 "	1 1-8 "
640	5.00	10 "	1 1-4 "

The 2 inch and 3 inch are divided to 16ths and 64ths of an inch on one side, and 32ds and 64ths on the other. The 4, 6, 8, and 10 inch are divided on both sides to 16ths and 32ds of an inch.



BROWN & SHARPE'S CENTER GAUGE

And Gauge for Grinding
and Setting Screw
Tools.



Method of Using Center Gauge.

D 1207.

The angles used on this gauge are 60 degrees. The four divisions upon the gauge of 14, 20, 24 and 32 parts to the inch are very useful in measuring the number of threads to the inch of taps and screws. The following parts to the inch can be determined by them, viz.: 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 20, 24, 28 and 32. The cut on the right shows some of the numerous uses to which this Gauge can be applied.

The table on the Gauge is used for determining the size of tap drills for sharp V threads, and shows in thousandths of an inch the double depth of thread of tap and screws of the pitches most commonly used. This table is made up by dividing 1.732, the double depth of thread of a screw that is one pitch, by the number of threads of the various pitches shown. For instance, the decimal .433, representing the double depth of thread of a screw that is four pitch, is obtained by dividing 1.732 by 4. In the same manner the double depth of thread of pitches not shown in the table may be readily obtained. The double depth of thread of a screw that is two pitch, for instance, is one-half of 1.732. As the double depth of thread represents the difference in the diameter of a tap and a tap drill, to obtain the diameter of a tap drill of any desired pitch it is only necessary to subtract the decimal showing the double depth of thread of that pitch from the diameter of the tap. For example, if the tap is four pitch and one inch diameter, subtract .433, the decimal showing the double depth of thread of this pitch in the table, from one, and the result, .567 of an inch, is the size of the tap drill, which would allow a sharp thread in the hole. Allowance is to be made for the extent to which it is desired the threads should be flattened.

No. 510. Price.....\$0.25 | No. 511. Tempered. Price\$0.35

No. 512. Center Gauges of the Whitworth or English Standard, 55 deg..\$0.25

No. 513. Tempered. Price......35



D 1208. WATCH GUARD CHARMS.

These are one inch steel rules and small center gauges furnished with split ring ready to attach.

Center Gauge or steel Rule, plain, with ring, each.....\$0.25

Same, nickel plated......30

" silver "......40

" gold "......50

No. 500. Center Gauge.

The Rules are graduated as follows:

No. 502. One edge each to 8ths, 16ths, 32ds and 64ths of an inch.

No. 504. One edge each to 16ths, 50ths, 64ths and 100ths of an inch.

Parallel
Clamps
Make
Good
Drilling
Jigs.

D 1209.

GAS HEATER.

For Tempering Drills, Punches, Chisels, Small
Tools, Etc.

This Gas Heater produces a colorless flame free from smoke and is a substitute for a forge in heating small tools to be hardened or tempered. A piece of steel one-half inch in diameter can be heated sufficiently for hardening in about six minutes.

DIRECTIONS: Put on a sufficient head of gas to prevent the flame from descending into the tube. For heating larger pieces, the flame should be nearly three inches wide. The upper ends of the curved side pieces should not be more than one-quarter of an inch apart. The articles to be heated should be held in the upper part of the flame, above the central blue part and parallel with it. The larger the piece to be heated the farther it should extend into the flame. The heater should be located in a dark place and supports may be provided for greater convenience in heating heavy articles.

No. 726. Price.....\$0.75



D 1210.

DARLING, BROWN & SHARPE'S SOLID STEEL MERCURY PLUMB BOBS.

These Plumb Bobs are bored out and filled with mercury, or quicksilver, which makes them unusually heavy, in proportion to their size, and the center of gravity low. The points are hardened, and the bodies and points are ground. The Plumb Bobs are nickel plated, and each is furnished with a braided silk line. The 3½ oz. can be easily carried in the vest pocket.

3½ oz., 4 in. long, ¼ in. diam., \$1.00 | 12 oz., 5½ in. long, ⅜ in. diam., \$2.00

6 " 4½ " " ⅝ " " 1.50 | 16 " 6 " " 1 " " 2.50



BERGEN PLUMB BOBS.



D 1221.
Bergen Plumb Bob in Case.

D 1222.
Bergen Plumb Bob.

Bergen Plumb Bob made from forged steel, case hardened; warranted accurate, weight 1 pound.

Price, with wooden shell protector, nickel plated, each..... \$1.75



D 1223. THOMPSON'S PERFECT PLUMB BOBS.

Mechanics'.

Surveyors'.

Style	1	2	3	4	5	6	7	8	9	10
Number	1	2	3 3/4	5	8	13 1/2	18	30	7 1/2	10 1/2
Weight, ounces.	1	2	3 3/4	5	8	13 1/2	18	30	7 1/2	10 1/2
Price, each.....	\$0.85	\$0.95	\$1.10	\$1.25	\$1.50	\$2.50	\$3.00	\$3.50	\$2.00	\$2.50

Complete set, one each Nos. 1 to 10 in handsome case with glass cover... \$19.15

These are made of *Bronze* beautifully finished, with fine steel points and guaranteed to be *positively* accurate.



D 1224.

SMITH'S MILLWRIGHT PLUMB BOBS.

Number	0	1	2	3	4	5	6
Diameter, in....	1 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3
Weight.....	1 lb.	2 lb.	2 lb. 4 oz.	2 lb. 10 oz.	3 lb. 2 oz.	3 lb. 8 oz.	4 lb. 4 oz.
Price, each.....	\$1.50	\$2.50	\$2.75	\$3.00	\$3.25	\$3.50	\$4.00



D 1225. ADJUSTABLE PLUMB BOBS.

A suitable length of line comes reeled on each Bob.

Number.....	1	2	5
Price, each.....	\$1.50	\$1.75	\$1.00
Metal	Bronze with Steel Point.		Iron. Milling Cutters Made for Bicycle Work.



D 1226. ULSTER SPEED INDICATOR.

Made on the principle of the stop-watch. Registers 2,000 revolutions.

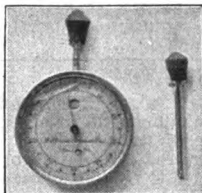
Price, each..... \$6.00



D 1227.

DOUBLE DIAL SPEED INDICATOR.

Extra quality. Price, each..... \$6.00



D 1228.

THE LIGHTNING SPEED INDICATOR.

It registers as high as 1,000, as seen by the cut. Can be held at any angle, making it very convenient for dynamo machines and the like. Has a silver-plated dial and the face covered with a watch crystal. Satisfaction guaranteed or money refunded.

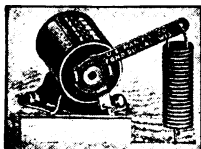
Price, each..... \$2.00



D 1229.

BERGEN SINGLE DIAL SPEED INDICATOR.

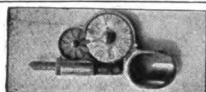
Price, each..... \$1.00



D 1230.

U. S. COUNTER.

Why guess on results of your printing presses, die presses, screw machines, wood working machines, all power and automatic machines, when you can buy an absolutely correct counter. Counts to 100,000 and repeats. Stops leakages, shortages and disputes. Price, each..... \$2.50



BERGEN DOUBLE DIAL SPEED INDICATOR.

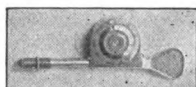
D 1241.

Price, each.....\$1.50


D 1242.

FOWLER'S PATENT SPEED INDICATOR.

This Indicator is simple in construction, compact and accurate. It will indicate to 5,000 revolutions, either right or left hand. An extra point, 6 inches long, for use on dynamo machines, can be furnished when desired. Price, each, \$2.00; Extra points, 50c.



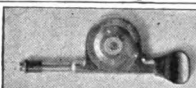
STARRETT'S HIGH SPEED INDICATOR, D 1243.

No. 104.

Price, each.....\$1.00 | In leather case.....\$1.50

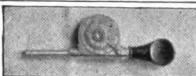
We supply the Indicators with a spindle, 7½ in. long, for use on dairy machines, etc., for 50c. extra.

The Indicator in pasteboard box (list \$1.00) sent unless otherwise ordered.


D 1244.

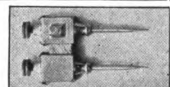
STARRETT'S IMPROVED SPEED INDICATOR, No. 106.

In pasteboard box, \$1.50 | In leatherette case, \$2.00



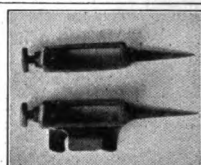
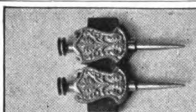
STARRETT'S REGISTERING SPEED INDICATOR, No. 107.

In pasteb'd bx...\$3.00 | In leatherette case...\$3.50


D 1246. Brass.

Brass, No. 1 2 3 4
Fits a Bar, in.. 5-16x1-2 3-8x3-4 1-2x1 3-4x1 1-2
Price, per pair. \$0.80 \$1.15 \$1.50 \$2.75

Smith's Trammel Points, per pair.... \$1.00


D 1247. Smith's.


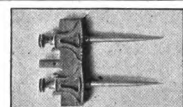
STANLEY IMPROVED TRAMMEL

D 1248.

POINTS.

Per Pair.

No. 1. Small, Bronze Metal, Steel Points.... \$1.00
No. 2. Medium, " " " " 1.25
No. 3. Large, " " " " 1.75


D 1249.

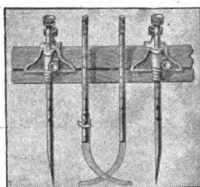
COOK'S IMPROVED TRAMMEL POINTS.

Made of Bronze Metal, with Forged Steel Point, Hardened. Either point can be removed and the pencil socket accompanying each pair, put in its place. The best Trammel Points in the market.

Adjustable like *spring dividers*. Light and durable. For bar 3-8 x 7-8.

With 3-in. points, adjustable, \$2.50 | With 3-in. points, not adjustable, \$1.50
Extra long points, 5-inch, per set, \$0.35

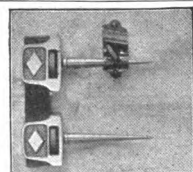
D 1250. COOK'S NEW EXTENSION BEAM TRAMMELS.



This cut represents a pair of trammel heads, with an opening through the under side to accommodate the extension, giving width and stiffness in proportion to the length required for large work, while it is equally well adapted to receive a narrow beam for light work. The points are eccentric and may be loosened and rotated in their sockets to make fine adjustments. Either point may be removed and a common pencil inserted.

The marks on legs enable them to be adjusted in proper relation to each other.

Price, complete.....\$3.25 | Price, without caliper legs....\$2.50



D 1251. DIAMOND TRAMMEL POINTS.

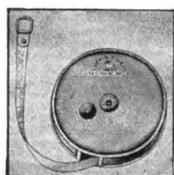
This is the best Tram in the market.
Pencil Holders, each, 20 cents.

No.	Size Bar	Plain.	With Adj.
No. 1	Size Bar, 1-4x1-2.....	\$1.25	\$1.75
" 2	" 5-16x3-4.....	1.50	2.00
" 3	" 3-8x7-8.....	1.75	2.50
" 4	" 5-8x1½.....	2.50	3.50

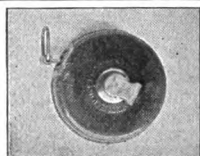
D 1262.

POCKET STEEL TAPES.

German Silver Cases, Spring Wind, with Stop.



Number.	Marked one side, U. S. Standard, Graduated in 1-16ths.	Each.
153	36 inches, 1-4 inch Tape.	\$1.40
154	48 " 1-4 " "	1.60
155	60 " 1-4 " "	1.80
156	72 " 1-4 " "	2.00
157	7 feet, 1-4 " "	2.30
159	9 " 5-16 " "	2.70
1512	12 " 5-16 " "	3.60



D 1263. "RELIABLE" STEEL MEASURING TAPES.

With double folding flush handle, opened by pressing small pin or button on opposite side. Hard leather cases. Nickel-plated trimmings. Measurements guaranteed perfectly accurate. With 3-8 inch Tapes.

Marked feet and 12ths (inches and eighths).	Marked feet, 10ths and 100ths of ft., for Surveyors' Use.	Length.	Diam. of Case.	Each.	Extra for Nickel-Plated Tapes.
No. 200	No. 200 D	25 ft.	2½ in.	\$ 4.50	\$1.00
" 201	" 201 D	33 "	2½ "	5.20	1.00 Dies,
" 202	" 202 D	40 "	3 "	6.00	1.50 Special
" 203	" 203 D	50 "	3 "	7.20	1.50 Shapes
" 204	" 204 D	66 "	3½ "	9.20	1.75 and
" 205	" 205 D	75 "	3½ "	10.40	1.75 Threads.
" 206	" 206 D	100 "	4 "	12.80	1.75 Made to
					2.00 Order.

The above Tapes are marked on the backs with links and poles. When links are not wanted, they will be supplied marked at every foot instead, at same price. Tapes marked feet on one side, meters on the other, add 2½ cents per foot to list price. Tapes marked feet and 12ths on one side, feet and 10ths on other, add 2½ cents per foot to list price.

D 1264.

"RIVAL" STEEL MEASURING TAPES.



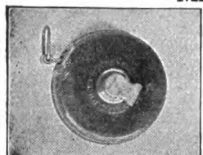
The "Rival" Tape is put on the market to meet the demand from contractors, builders, masons, and others who appreciate the value of a steel measuring tape and who do not feel inclined to invest in the higher priced article. While it is sold at a comparatively low price, yet none of its practical features have been sacrificed. The measurements are as accurate as in our higher priced goods and are guaranteed. The case is of hardened steel, nicely nickel plated, is compact, very durable, and will not bend or break. The winding drum is of somewhat larger diameter than in our "Reliable," which gives a good long crank and winds easily, notwithstanding it has not the advantage of the extension handle. The handle folds nearly flush with the case. We can safely recommend this tape to the purchaser as an article which is first-class, durable and perfectly accurate. Packed one-half dozen in a box.

Nickel-plated steel cases, flush handles, ⅜ inch tapes, marked one side only, in tenths and twelfths.

Marked feet and 12ths (inches and eighths).	Marked feet, 10ths and 100ths of ft. for surveyors' use.	Length.	Diameter of case.	Each.
No. 240	No. 240 D	25 ft.	2¾ in.	\$3.90
" 243	" 243 D	50 "	3¼ "	4.80
" 245	" 245 D	75 "	3¾ "	6.30
" 246	" 246 D	100 "	4¾ "	81.0

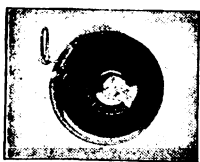
D 1265.

METALLIC MEASURING TAPES.



Tape ⅝ inch wide, made of best woven linen with metallic warp. Hard leather cases, folding handles with brass trimmings. These goods are guaranteed strictly first-class, and form, in connection with our line of Steel Tapes, the best and most complete line of high grade measuring tapes made. MARKED ONE SIDE ONLY.

Length.....	25 ft.	33 ft.	40 ft.	50 ft.	66 ft.	75 ft.	100 ft.
12ths, No.....	500	501	502	503	504	505	506
Price, each.....	\$2.04	2.40	2.64	3.00	3.36	3.72	4.64

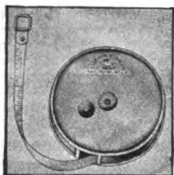


"STERLING" LINEN MEASURING TAPES.

D 1276.

Tape one-half inch wide, made of Best Woven Linen, reinforced with leather the first four inches and heavily coated. Nickel-plated trimmings, flush handle, hard leather cases. Marked one side only in feet, inches and halves.

No. 400, 25 ft. Each, \$1.50 | No. 405, 75 ft. Each, \$2.50
No. 403, 50 ft. Each, 2.00 | No. 406, 100 ft. Each, 3.00



D 1277.

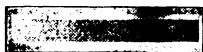
CHESTERMAN'S MEASURING TAPES.

No. 38 L., Steel Spring Tape, $\frac{3}{8}$ in. wide, divided in either 10ths or 12ths.

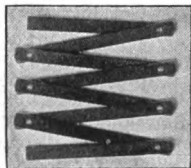
Length, 25 33 40 50 66 75 100 ft.
Each, \$5.00 6.00 7.00 8.00 10.00 12.00 15.00

No. 34 L., Linen Tape, metallic woven, folding handles, $\frac{5}{8}$ in. wide, divided in 12ths.

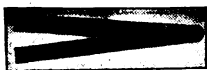
Length, 25 33 40 50 66 75 100 ft.
Each, \$2.00 2.30 2.60 2.90 3.25 3.75 4.75



No. 300 D.



No. 57.



No. 58.

D 1278. CHESTERMAN'S STEEL RULES.

No. 300 D. Graduated 8, 16, 32, 64ths. Width and thickness, $\frac{3}{4}$ in. x 21 W. G., $1\frac{1}{8}$ in. x 19 W. G.

Length, in inches, 4 6 9 12
Price, each 27c 30c 40c 50c

No. 57. Etched both sides, $\frac{3}{8}$ in. x 28 W. G., with 3 inch joints.

Length, feet 1 2 3
Price, each 17c 34c 50c

No. 66. $\frac{3}{4}$ in. x 21 W. G., one ft. long, each, \$0.17

No. 58. $\frac{3}{4}$ in. x 21 W. G., one stop joint, brass ends, 2 ft. each, .50

No. 501. Same as No. 58, only brass " .50

No. 70. $\frac{5}{8}$ in. x 21 W. G., 6 in. joints, 2 ft. long each, .60

ENGINEERS' RULES, 2 FT., $1\frac{1}{2}$ x 19 W. G., 1 JOINT.

No. 580. Inches on two edges, into 8ths and 16ths each, \$1.20

No. 580 S. Same as above, but to form square each, 1.40

No. 581. Inches on two edges into 8ths and 16ths, 32ds and 64ths .. " 1.35

No. 581 S. Same as above, but to form square. " 1.55

No. 582. Inches on four edges, graduated 8, 16, 32 and 64ths " 1.60

No. 582 S. Same as above, but to form square. " 1.80

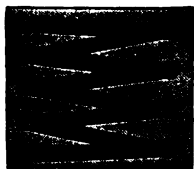


D 1279. ENGINEERS' POCKET RULES.

Flexible Wood, Very Accurate.

Nos. 1731 and 1732 are provided with ingenious springs, which hold the rule in a straight line when open, and require no attention whatever when folding it.

No. 1731.	4 ft., 8 fold, div. 1-16 and 1-16, with springs	each, \$0.90	Helmet
No. 1732.	" " " " " " meters, with springs	" .90	Bronze
No. 1733.	" " " " " " " " extra flexible	" .60	Makes
No. 1734.	" " " " " " 1-16, flexible	" .40	Stiff
No. 1736.	" " " " " " meters, flexible	" .40	Springs.



D 1280. FOLDING STEEL POCKET RULES.

All our Steel Rules being made of hardened steel the corners and edges will not wear off, and the figures and divisions are always plain.

These rules are very neat and convenient for light work. They are made of spring steel and will bend to a 3-inch circle. They occupy very little space and are conveniently carried in the vest pocket.

All graduated 16th of inches, both sides, and

packed in neat paper boxes.

No.	Rules only, Each.	Rules with Cases, Each.
31. 1 ft. Folding Pocket, $\frac{3}{8}$ in. x 28 gauge, 3 in. joints, 4 fold, \$0.40	\$0.40	\$0.55
41. 1 " " " " " " 4 " 3 " " .40	.40	.55
41. 2 " " " " " " 4 " 6 " " .75	.75	.95
41. 3 " " " " " " 4 " 9 " " 1.10	1.10	1.35
41. 4 " " " " " " 4 " 12 " " 1.45	1.45	1.70



D 1291.

FOLDING STEEL RULES.

	Rules only each.	Rules with Leather cases each.	Nickel- Plated, extra each.
No. 70. 2 ft. Folding Pocket, $\frac{3}{4}$ in. x 21 gauge, 6 in. joints, 4 fold. 8ths of in. on one side, 16ths on other..	\$1.40	\$1.80	\$0.30
No. 77. 2 ft. Folding Pocket, $\frac{3}{4}$ in. x 21 gauge, 8 in. joints, 3 fold. Board measure, 8 ft. to 22 ft. lengths.	1.70	2.10	.30
No. 80. 2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, 12 in. joints, 2 fold. 16th of inches on one side, 8ths on other.....	1.00	.....	.30
No. 85. 2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, ONE STOP JOINT, GERMAN SILVER ENDS, 8ths inches one side, 16ths on other.....	1.20	.....	.30
No. 86. 2 ft. Folding, $\frac{3}{4}$ in. x 21 gauge, ONE STOP JOINT, GERMAN SILVER ENDS, 16ths of inches one side, circumference inches on other	1.70	.....	.30

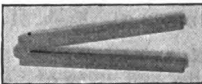
**D 1292. STRAIGHT STEEL RULES.**

No. 60. $\frac{3}{4}$ in. x 21 gauge, 8ths on one side, 16ths on other side, marked on lower edge only.			
1 ft.....	each, \$0.40	Nickel plated, extra.....	each, \$0.20
2 ".....	" .80	" " " " " " " " " " " "	.30
No. 62. $1\frac{1}{4}$ in. x 16 gauge, 8ths on lower edge, 16ths on upper edge, both sides.			
1 ft.....	each, \$0.80	Nickel plated, extra.....	each, \$0.20
2 ".....	" 1.50	" " " " " " " " " " " "	.35
3 ".....	" 2.20	" " " " " " " " " " " "	.50
4 ".....	" 2.80	" " " " " " " " " " " "	.60

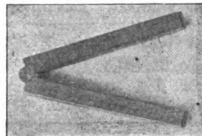
All the above rules have a hole in one end for hanging up at bench.

STANLEY BOXWOOD RULES.Taps and
Dies Made
to Any
Degree of
Accuracy.**ONE FOOT—FOUR FOLD—NARROW.**

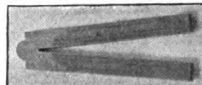
D 1293. No. 69. Round Joints, Middle Plates,
8ths and 16ths of inches, $\frac{5}{8}$ inch wide.
Per dozen, \$3.00. Each, \$0.30

**ONE FOOT—FOUR FOLD—NARROW.**

D 1294. No. 65. Square Joint, Middle Plates,
8ths and 16ths of inches, $\frac{5}{8}$ inch wide.
Per dozen, \$3.50. Each, \$0.35

**ONE FOOT—FOUR FOLD—NARROW.**

D 1295. No. 64. Square Joint, Edge Plates,
8ths and 16ths of inches, $\frac{5}{8}$ inch wide.
Per dozen, \$5.00. Each, \$0.50

**ONE FOOT—FOUR FOLD—NARROW.**

D 1296. No. 65 $\frac{1}{2}$. Square Joint, Bound,
8ths and 16ths of inches, $\frac{5}{8}$ inch wide.
Per dozen, \$11.00. Each, \$1.10

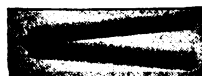
**ONE FOOT—FOUR FOLD—NARROW.**

D 1297. No. 57. Arch Joint, Bound. 8ths
and 16ths of inches, $\frac{5}{8}$ inch wide

Per dozen, \$12.00. Each, \$1.20

TWO FOOT—FOUR FOLD—NARROW.

D 1298. No. 68. Round Joint, Middle
Plates, 8ths and 16ths of in., 1 in. wide.
Per dozen, \$4.00. Each, \$0.40

**TWO FOOT—FOUR FOLD—NARROW.**

D 1299. No. 61. Square Joint, Middle Plates,
8ths and 16ths of inches, 1 inch wide.
Per dozen, \$5.00. Each, \$0.50

STANLEY BOXWOOD RULES.—Continued.**TWO FOOT—FOUR FOLD—NARROW.**

- D 1310.** No. 63. Square Joint, Edge Plates, 8ths, 10ths, 12ths and 16ths inches, 1 inch wide.....Per dozen, \$7.00. Each, \$0.70

TWO FOOT—FOUR FOLD—NARROW.

- D 1311.** No. 53½. Arch Joint, Edge Plates, 8ths, 10ths, 12ths and 16ths of inches, with inside Beveled Edges and Architect's Drafting Scales, 1 in. wide.....Per dozen, \$15.00. Each, 1.50

TWO FOOT—FOUR FOLD—NARROW.

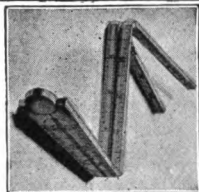
- D 1312.** No. 62. Square Joint, Bound, 8ths, 10ths, 12ths and 16ths of inches, Drafting Scales, 1 inch wide.....Per dozen, \$15.00. Each, 1.50

TWO FOOT—FOUR FOLD—NARROW.

- D 1313.** No. 54. Arch Joint, Bound, 8ths, 10ths, 12ths and 16ths of inches, 1 inch widePer dozen, \$16.00. Each, 1.60

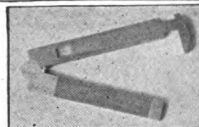
TWO FOOT—FOUR FOLD—BROAD.

- D 1314.** No. 78½. Double Arch Joint, Bound, 8ths, 10ths and 16ths of inches, Drafting Scales, 1½ inches wide....Per dozen, \$24.00. Each, 2.40

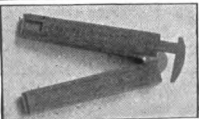
**TWO FOOT—SIX FOLD.**

- D 1315.** No. 58. Arch Joint, Edge Plates, 8th, 10ths, 12ths and 16ths of inches, ¾ inch widePer dozen, \$13.00. Each, \$1.30

Gardner
Opening
Die
Head
Cuts
Exact
Threads.

**CALIPER RULES—SIX INCH.**

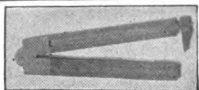
- D 1316.** No. 36. Square Joint, Two Fold, 8ths, 10ths, 12ths and 16ths of inches, ¾ inch wide.....Per dozen, \$7.00. Each, \$0.70

**CALIPER RULES—ONE FOOT—FOUR FOLD.**

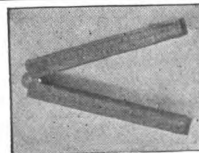
- D 1317.** No. 32. Arch Joint, Edge Plates, 8ths, 10ths, 12ths and 16ths of inches, 1 inch wide.....Per dozen, \$12.00. Each, \$1.20

CALIPER RULES—ONE FOOT—FOUR FOLD.

- D 1318.** No. 32½. Arch Joint, Bound, 8ths, 10ths, 12ths and 16ths of inches, 1 in. wide.....Per dozen, \$20.00. Each, \$2.00

**CALIPER RULES—ONE FOOT—TWO FOLD.**

- D 1319.** No. 36½. Square Joint, 8ths, 10ths, 12ths and 16ths of inches, 1½ in. wide. Per dozen, \$12.00. Each, \$1.20

**STANLEY IVORY RULES.****ONE FOOT—FOUR FOLD.**

- D 1320.** No. 90. Round Joint, Brass, Middle Plates, 8ths and 16ths of inches.....Per dozen, \$10.00. Each, \$1.00

ONE FOOT—FOUR FOLD.

- D 1321.** No. 92. Square Joint, German Silver Edge Plates, 8ths and 16ths of inches, ⅝ inch wide.....Per dozen, \$17.00. Each, 1.70

ONE FOOT—FOUR FOLD.

- D 1322.** No. 88. Arch Joint, German Silver Bound, 8ths and 16ths of in., ⅝ in. wide.....Per dozen, \$32.00. Each, 3.20

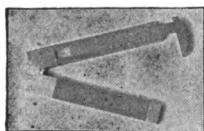
TWO FOOT—FOUR FOLD.

- D 1323.** No. 85. Square Joint, German Silver Edge Plates, 8ths, 10ths, 12ths and 16ths of inches, ⅝ inch wide.....Per dozen, \$54.00. Each, 5.40

TWO FOOT—FOUR FOLD.

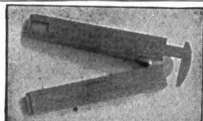
- D 1324.** No. 86. Arch Joint, German Silver Bound, 8ths, 10ths, 12ths and 16ths, Drafting Scales, 1 inch wide....Per dozen, \$80.00. Each, 8.00

STANLEY IVORY RULES.



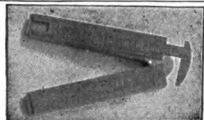
IVORY CALIPER RULE—SIX INCH.

D 1335. No. 38. Square Joint, German Silver, Two Fold, 8ths, 10ths, 12ths and 16ths of inches, $\frac{1}{8}$ inch wide
Per dozen, \$15.00. Each, \$1.50



IVORY CALIPER—ONE FOOT—FOUR FOLD.

D 1336. No. 39. Square Joint, German Silver Edge Plates, 8ths, 10ths, 12ths and 16ths of inches, $\frac{1}{8}$ inch wide
Per dozen, \$38.00. Each, \$3.80



IVORY CALIPER—ONE FOOT—FOUR FOLD.

D 1337. No. 40. Square Joint, German Silver Bound, 8ths and 16ths of inches, $\frac{1}{8}$ inch wide....Per dozen, \$44.00. Each, \$4.40

D 1338. BILLINGS' PATENT BEAM CALIPER.



The object of the design of this tool is to produce a caliper square possessing the minimum of weight with a maximum of stiffness and durability.

The entire caliper is made of steel, the jaws hardened and ground. The scale is divided to 64ths on one side and the other to 100ths of an inch. The graduation is accurate, and the finish of the tool is first-class in every respect. The construction of the caliper is such that it protects the scale from all wear and abrasion. Price.....\$6.00

D 1339. BILLINGS' PATENT BEAM CALIPER.

With Micrometer Adjustment.



This tool is the same in construction as above except that it has thin jaws that can be used for outside and inside measuring. Also, an important addition is the micrometer adjustment; all of which is shown by the cut. Price, each.....\$7.00

Malleable
Thumb
Screws
Carried in
Stock.

BILLINGS' PATENT HAND VISE.



D 1340.

This Vise is designed for jewelers, tool makers, and machinists' use. All parts are drop-forged of best steel for the purpose. The jaws have a positive opening and closing movement in parallel lines, actuated by a right and left hand screw, moving the jaws simultaneously toward or from each other. A hole is entirely through the handle and the jaws will grasp and hold central, round wire from 1-16 inch, up to and including 1-4 inch in diameter. The jaws open $\frac{1}{4}$ inch.



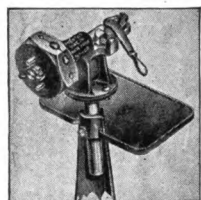
D 1341.

Hand Vise with
Clamp.

Hand Vise with-
out Clamp.

Vise without Clamp, each.....\$4.00
Clamps, each 2.00

Used as a bench
Vise.



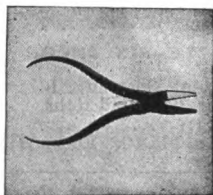
D 1342.

Table of ample size to conveniently hold all necessary tools.
Price, each\$7.00 | Column, with Tool Table....\$6.00

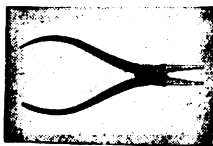
THE PRENTISS BICYCLE VISE, No. 100.

Designed especially for Bicycle Factories and Repair Shops. The most convenient and quickest-acting vise made. Thoroughly up to date. Holds frames or tube in any position. The jaws, which revolve, are faced with lead to prevent marring work, and are grooved to accurately fit six different diameters, varying by eighths from $\frac{1}{8}$ to $1\frac{1}{4}$ inclusive.

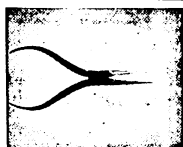
The Iron Column, or Stand can be adjusted to any suitable height, and is furnished with Tool

**D 1352.****FLAT NOSE PLIERS.**

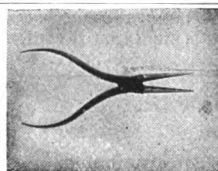
Size, inches.....	3	3½	4	4½	5	6	7	8
Stub's, each.....	\$0.55	.55	.55	.55	.60	.90	1.40	2.00
German, Stub's Pat- tern, No. 806½, ea.	.35	.35	.35	.35	.40	.55	.85	1.00
German, steeled, No. 802, each.....	.15	.15	.15	.20	.25	.30	.35	.50

**D 1353.****ROUND NOSE PLIERS.**

Size, inches.....	3	3½	4	4½	5	6	7	8
Stub's, each.....	\$0.55	.55	.55	.55	.60	.90	1.40	2.00
German, Stub's Pat- tern, No. 806½, ea.	.35	.35	.35	.35	.40	.55	.85	1.00
German, steeled, No. 802, each.....	.15	.15	.15	.20	.25	.30	.35	.50

**D 1354.****LONG FLAT NOSE PLIERS.**

Size, inches.....	3	3½	4	4½	5	6	7
Stub's, each.....	\$0.55	.55	.55	.55	.60	.90	...
German, Stub's Pat- tern, No. 810, ea.	.40	.40	.40	.40	.45	.60	.85

**D 1355.****LONG ROUND NOSE PLIERS**

Size, inches.....	3	3½	4	4½	5	6
German, Stub's Pattern, No. 810, each.....	\$0.40	.40	.40	.40	.45	.60

Malleable
Thumb
Nuts
Carried in
Stock.

D 1356.**WEAVER'S OR STOCKINGER'S PLIERS.**

Size, inches.....	3	3½	4	4½	5	6
Stub's, each.....	..	..	.55	.55	.60	.90
German, Stub's Pattern, No. 822, each.....	\$0.40	.40	.40	.40	.45	.60

**D 1357. Short Nose.****CHAIN PLIERS.**

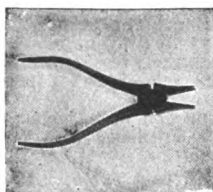
Short and Long
Nose.

**D 1358. Long Nose.**

Size, inches.....	3	3½	4	4½	5	6
German, Stub's Pattern, D 1357, No. 812, each..	\$0.40	.40	.40	.40	.45	.60
" " " " D 1358, " 813, " ..	.40	.40	.40	.40	.45	.60

**D 1359.****SIDE CUTTING PLIERS.**

Size, inches.....	4	4½	5	6	7	8
Stub's, each.....	\$1.00	1.00	1.00	1.10	1.80	2.40
German, Stub's Pat- tern, No. 864, each...	.65	.65	.65	.90	1.15	1.40
P. S. W., each.....	..	..	1.25	1.35	1.70	2.00

**D 1360.****WIRE CUTTERS AND PLIERS COM-
BINED.**

Size, inches.....	4½	6	8	10
Price, each.....	\$0.90	1.00	1.25	2.00

D 1371. CRONK'S PATENT WIRE CUTTER AND PLIER.



Size, inches..... 8 10
Price, each.....\$1.50 \$2.00

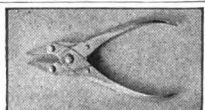
D 1372. FRY'S PATENT TELEGRAPH PLIERS.—For Splicing.

Size, inches..... 7 8 **We Cut Sheet Brass Special Sizes to Order.**
No. 842½. Price, each.....\$1.65 \$2.00



D 1373. BERNARD'S PATENT VISE PLIER.

Size, inches, 6½. Price, each.....\$1.50
Extra Jaws, each......25
Extra Thumb Nuts, each......60
Extra Screw Bolts, each......50



D 1374. BERNARD'S PATENT PLIERS—Flat Nose.

Sizes, inches..... 4½ 5½ 6½ 7½
Price, each.....\$0.70 \$0.90 \$1.15 \$1.50
“ Jaws, per set .45 .50 .55 .85



D 1375. BERNARD'S PATENT PLIERS—Round Nose

Sizes, inches..... 4½ 5½ 6½
Price, each.....\$0.70 \$0.90 \$1.15
“ Jaws, per set .45 .50 .55

D 1376. BERNARD'S PATENT CUTTING PLIERS.



Sizes, inches..... 4½ 5½ 6½ 7½
Price.....each, \$1.15 \$1.45 \$1.75 \$2.40
Extra Cutting Jaws, “ .45 .50 .55 .70
“ “ Blades, “ .28 .30 .33 .40
“ Center Screws “ .03 .03 .03 .04
“ Bolts and Nuts, .05 .05 .05 .05

All Bernard's Pliers are tested before leaving the factory and are warranted to be perfect in quality and workmanship. In case of breakage caused by flaws we will replace the damaged part by a new part.



D 1377. PEASE COMBINATION PLIERS.

Sizes, inches..... 6 10 14
Black Finish, each.....\$ 1.35 \$ 1.80 \$ 2.40
“ “ per dozen..... 13.50 18.00 24.00
Nickel Plated, each..... 1.50 2.10 3.00
“ “ per dozen.... 15.00 21.00 30.00

D 1378. IMPROVED COMBINATION PLIERS.

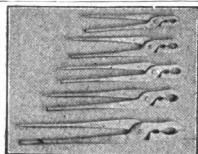


The best Combination Plier made. Length, 7 inches, made of the finest steel, well tempered and finished. Has flat nose and gas plier with side or flush cutter, and heavy wire cutters. Screwdriver and reamer on end of handles. Price, each...\$1.35



D 1379. BURNER PLIERS.

Sizes, inches..... 5 6
Price, each.....\$0.60 \$0.70



D 1380.

GAS PLIERS.

Size, in. 4 5 6 7 8 9 10 12 14 16
Ea...\$0.50 .50 .65 .75 .85 .95 1.10 1.30 1.70 2.10



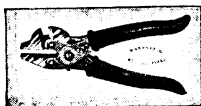
D 1391.

LINEMAN PLIER AND CUTTER.

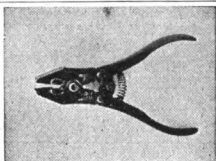


Size, 8 inches. Price	each, \$2.70
Extra Cutting Jaws	“ .70
Extra Cutting Blades	“ .40
Extra Center Screws	“ .04
Extra Bolts and Nuts	“ .05

D 1392. ELECTRIC PLIER AND CUTTER—Rubber Handles.



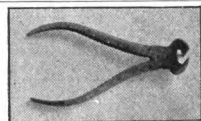
Size, 8 inches. Price	each, \$3.00
Extra Rubber Handle Covers	“ .15
Extra Cutting Jaws	“ .80
Extra Cutting Blades	“ .40
Extra Center Screws	“ .04
Extra Bolts and Nuts	“ .05

LINDSAY'S GIANT SIDE CUTTING
D 1393. PLIERS.

Sizes, inches	6	8
Price, each	\$1.20	\$2.10

Will cut No. 6 telegraph wire. Removable blades. Broken parts can be duplicated.

Try our
Brush
Copper for
Electrical
Work.



D 1394. END CUTTING NIPPERS.

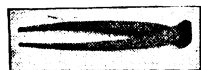
Sizes, inches	3	3½	4	4½
German, Stubs' Pattern, No. 850½, each	65c	65c	65c	65c
German, steeled, No. 848, each	45c	45c	45c	45c

Size, inches	5	5½	6	6½	7	8
Stubs', each	\$1.05	\$1.15	\$1.40	\$1.65	\$1.90	\$2.50
German, Stub's Pat., No. 850½, ea. ....	.65	.75	.80	1.00	1.15	1.50
German, steeled, No. 848, each .....	.50	.55	.60	.70	.80	1.05

D 1395. DIAGONAL CUTTING NIPPERS.



Size, inches	3	3½	4	4½	5
Stubs', each .....	.....	.....	.....	.....	\$1.05
German, Stubs' Pattern, No. 853, each	\$0.75	.75	.75	.75	.75
Size, inches	5½	6	6½	7	8
Stubs', each	\$1.15	1.40	.....	.....	.....
German, Stubs' Pattern, No. 853, each .....	.85	.95	1.10	1.20	1.60



D 1396. END CUTTING NIPPERS.

Size, inches	5	6	6½	7	8	9	10
No. 854. Each	\$0.35	.40	.....	.50	.60	.85	1.00

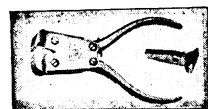


D 1397. END CUTTING NIPPERS.

Extra quality cast steel for Piano Wire. Hand-Forged.

Size, inches	6	6½	7
No. 857. Each	\$1.30	1.60	1.85

HALL'S PATENT DOUBLE COMPOUND CUTTING NIPPERS.



D 1398.

NIPPERS—REGULAR FINISH.

No. 1. Size, 4 inch, Nippers	each, \$1.20
“ 2. “ 5 “ “	“ 1.35
“ 3. “ 6 “ “	“ 1.95
“ 4. “ 7 “ “	“ 2.10
“ 6. “ 8 “ “	“ 2.40
“ 9. “ 11 “ “	“ 2.70

PARTS—REGULAR FINISH. ALL PARTS INTERCHANGEABLE.

No. 1. Jaw	each, \$0.30	Handles	each, \$0.30
“ 2. “	“ .30	“	“ .30
“ 3. “	“ .36	“	“ .36
“ 4. “	“ .40	“	“ .40
“ 6. “	“ .50	“	“ .50
“ 9. “	“ .50	“	“ .60

Extra Screws, 60 cents per dozen, except Nos. 6 and 9. per doz. 1.20
Springs, 60 cents per dozen, except Nos. 6 and 9. “ .84

STARRETT'S ADJUSTABLE JAW CUT-NIPPER—For Bicycle Use.



We also make jaws specially shaped for cutting wire in bicycle rims.

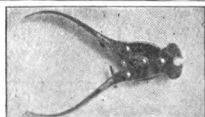


D 1409. Size No. 1.

5½ inch, M (for Music wire).....	\$2.00
5½ " C (for common use).....	2.00
5½ " B (for Bicycle use).....	2.00
7 " either M or C	2.50

D 1410.

Extra Jaws, either M, C or B, which should be designated as above, per pair \$0.50
Unless otherwise ordered, Cut-Nippers with C jaws will be sent.



D 1411. STEVEN'S NIPPERS, No. 90.

5 inch, each	\$1.50
Extra Jaws, each.....	.50
6 inch, each	1.75
Extra Jaws, each.....	.50

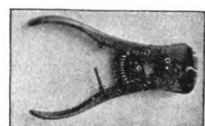


D 1412. STEVEN'S BICYCLE SPOKE NIPPER No. 91.

6 inch, each.....	\$1.75
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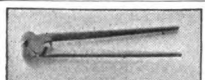
D 1413.

LINDSAY'S GIANT NIPPERS.



Broken parts can be duplicated.

5 inches, will cut 3-32 inch wire, each.....	\$1.35
Single Jaw, for 5 inch nipper, each.....	.50
Single Handles, for 5 inch nipper.....	.30
Single Spring, for 5 inch nipper.....	.15
7 inches, will cut 3-16 inch wire, each.....	2.10
Single Jaw, for 7 inch nipper, each.....	.75
Single Handles, for 7 inch nipper.....	.40
Single Spring, for 7 inch nipper.....	.20



D 1414. Carew's Cutter.

CAREW'S PATENT WIRE CUTTER.

CUTTERS.

6 inch.....	\$1.75	12 inch.....	\$2.60
8 "	2.00	14 "	3.00
10 "	2.25		

EXTRA JAWS.

6 inch, per pair..	\$0.50	12 inch, per pair..	\$0.65
8 " .....	.55	14 " .....	.70
10 " .....	.60		

D 1415. Carew's Jaws.

These cutters are made throughout of *Forged Steel*. The adjustable jaws are made of the best tool steel.



D 1416. ACME CUTTING NIPPERS.

Drop-forged of steel, with removable cutters.

Sizes.....	6	8	10	11	12	15
Price, each.....	\$1.25	1.50	1.75	2.00	2.25	3.00
Extra Cutters, per pair.....	.35	.35	.40	.40	.40	.50



D 1417. HARGREAVE'S SPLICING CLAMPS.

For Electricians.

Made in three finishes. For 4, 6, 8 or 9 wire.

Black, each.....	\$2.70
Polished Head (or half polished), each.....	2.80
Full polished, each.....	3.00

No. 1 has holes as per cut, No. 4 has holes reversed.

Made of best quality steel, well tempered and finished.

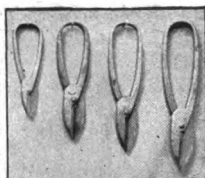
For Useful
Tables, see
Back of
Book.

D 1418.

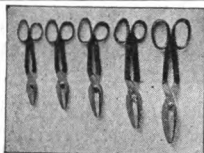
THE BILLINGS WIRE CUTTER.



This tool is drop-forged of the best steel and provided with four cutting edges on the rim besides two which are enclosed. It will cut iron wire, tool steel wire and Stubs' rods. There is also an adjustable gauge attached by which wire can be cut into uniform lengths. The workmanship is of the best, and the tool is warranted to give perfect satisfaction. Total length, 10 inches. Price, each, \$2.00

**D 1429. BROWN'S SNIP SHEARS.****Polished Cast Steel.****Special
Drills,
Made to
Order.**

Sizes....	5	6	7	8	9	10	12
Per Doz. \$	10.50	10.50	12.00	14.00	15.50	17.00	20.00
Each....	1.00	1.00	1.20	1.40	1.50	1.75	2.00

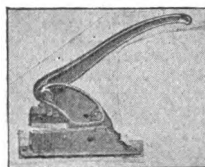
**D 1430.****TINNERS' HAND SHEARS OR SNIPS.**

Number.....	6½	7	8	9	10	11
Cut, inches....	4½	4	3½	3	2½	2
Price, each....	\$3.00	2.50	2.00	1.50	1.40	1.25

All of above left hand.

**D 1431. TINNERS' BENCH SHEARS.**

Number.....	00	0	1	2	3	4	5	6
Cut, inches.....	12	10½	9	8½	8¾	8	7	6
Price, each.....	\$13.50	12.00	8.00	7.00	6.00	5.00	4.00	3.50
Elbow bench, each.....	\$ 5.25							
Elbow bench, extra heavy, cuts 6 inch, each.....	12.00							

D 1432. THE OLD COLONY BENCH SHEAR AND SHEET IRON CUTTER.

No. 1. This machine is designed to cut Sheet Iron any width and thickness up to 1-8 inch, and is intended particularly for use upon the work-bench. Weight, 11 pounds. Price.....\$7.00

No. 2. This Shear is of the same design as the No. 1, illustrated. It will cut Sheet Iron up to 3-16 inch in thickness. Weight, 27 lbs. Price..\$12.00

No. 3. By means of the slotted connecting bar, the lever handle can be operated in any position desired. Will cut Sheet Iron up to 1-4 inch in thickness. W't, 55 lbs....\$20.00

D 1433.**FOX UNIVERSAL TRIMMER.**

No. of Machine.	Length of Stroke.	Size of Bed.	List Price.
4 A	8 in.	8x17	\$30.00
4 D	8 "	12x20	40.00
4 E	9 "	13x30	63.00
6 A	12 "	13x27	58.00
6 E	13 "	18x40	90.00

D 1434. LITTLE GIANT COMBINED PUNCH AND SHEAR.

Lever can be worked readily from either end, enabling the workman to stand close to his work, thus handling it easily at all times. Punches are held by Chuck, as shown in cut, thus doing away with set screws and keys. Will punch and cut No. 10 Band Iron and cut 3-8 inch Round Iron Rod.

Price, including 3-16, 1-4, 5-16 and 3-8 inch Punches\$35.00
Extra Punches, each......35

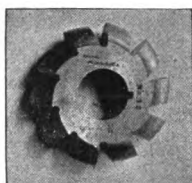
D 1435. PATENT WIRE CUTTER.

No. 1 Shear will cut wire rods from ¼ inch diameter to the smallest size, leaving the ends without a burr. It has 12 holes, graduated from ¼ inch to No. 50 Stubs' Steel Wire Gauge. Price, each, \$9.00

No. 2 will cut from ½ inch diameter to the smallest size. It has seven holes graduated from ½ inch to ¼ inch. Price, each.....\$20.00

We carry in stock, at Chicago, a large assortment of L. S. Starrett Co.'s STANDARD Cutters.

D 1446. PATENT INVOLUTE CUTTERS.—For Teeth of Gear Wheels.



NOTICE:—The forms of all our Gear Cutters are originated and made by use of expensive special machinery, under careful supervision, therefore are free from all imperfections found in cutters the forms of which are obtained from cutters which are more or less imperfect both on account of alteration in tempering or imperfections of workmanship. All gears of same pitch cut with these Cutters are interchangeable.

Diametral Pitch.	Price each Cutter.	Diam. of Cutter. In.	Hole in Cutter. In.	Diametral Pitch.	Price each Cutter.	Diam. of Cutter. In.	Hole in Cutter. In.
*2	\$12.50	5	1 1-4	16	\$2.45	1 15-16	7-8
*2 1-4	11.25	4 1-2	1 1-4	18	2.35	1 15-16	7-8
*2 1-2	10.00	4 1-4	1 1-4	20	2.30	1 7-8	7-8
*2 3-4	9.00	4	1 1-4	22	2.20	1 13-16	7-8
3	7.00	3 13-16	1 1-4	24	2.10	1 3-4	7-8
*3 1-4	6.50	3 11-16	1 1-4	26	1.95	1 3-4	7-8
*3 1-2	6.25	3 1-2	1 1-4	28	1.80	1 3-4	7-8
*3 3-4	6.00	3 3-8	1 1-4	30	1.80	1 3-4	7-8
4	5.50	3 3-8	1 1-4	32	1.80	1 3-4	7-8
*4 1-2	5.00	3 1-4	1 1-4	36	1.80	1 3-4	7-8
5	4.50	3 1-16	1 1-4	*38	1.80	1 3-4	7-8
*5 1-2	4.20	2 7-8	1 1-4	40	1.80	1 3-4	7-8
6	3.90	2 3-4	1 1-16	*44	1.80	1 3-4	7-8
7	3.60	2 9-16	1 1-16	48	1.80	1 3-4	7-8
8	3.40	2 1-2	1 1 16	*50	1.80	1 3-4	7-8
9	3.20	2 3-8	1 1-16	*56	1.80	1 3-4	7-8
10	3.00	2 1-8	7-8	*60	1.80	1 3-4	7-8
11	2.75	2 1-16	7-8	*64	1.80	1 3-4	7-8
12	2.65	2	7-8	*70	1.80	1 3-4	7-8
*13	2.60	2	7-8	*80	1.80	1 3-4	7-8
14	2.55	2	7-8	*120	1.80	1 3-4	7-8
*15	2.50	2	7-8				

Cutters marked * are made to order.

Gears cut with our Cutters will work with gears cut in accordance with the Brown & Sharpe system, but we would prefer that customers adopt our Cutters exclusively, in order that we may guarantee satisfactory results.

Special
Taps
Made to
Order.

D 1447. INVOLUTE GEAR CUTTERS.—Extra Large Diameter.

Diametral Pitch.	Price.	Diameter of Cutter.	Hole in Cutter.	Diametral Pitch.	Price.	Diameter of Cutter.	Hole in Cutter.
3	\$8.00	4 3-4 in.	1 1-4 in	5	\$5.25	4 in.	1 1-4 in
*3 1-4	7.75	4 1-2 "	1 1-4 "	*5 1-2	5.00	4 "	1 1-4 "
*3 1-2	7.25	4 1-2 "	1 1-4 "	6	4.75	8 3-4 "	1 1-4 "
*3 3-4	6.75	4 1-4 "	1 1-4 "	*7	4.50	3 5-8 "	1 1-4 "
4	6.25	4 1-4 "	1 1-4 "	8	4.25	3 1-2 "	1 1-4 "
*4 1-2	5.75	4 1-4 "	1 1-4 "	*9	4.00	3 1-2 "	1 1-4 "

Cutters marked * are made to order.

Our Gear Cutters can be sharpened without changing their form. According to the system adopted by us any wheel of one pitch will gear into any other wheel or into a rack of the same pitch. *Eight cutters are required for each pitch.* These eight cutters are adapted to cut from a pinion of twelve teeth to a rack, and are numbered respectively as follows:

No. 1 will cut wheels from 135 teeth to a rack.			
" 2	"	"	55 " " 134 teeth.
" 3	"	"	35 " " 54 "
" 4	"	"	26 " " 34 "
" 5	"	"	21 " " 25 "
" 6	"	"	17 " " 20 "
" 7	"	"	14 " " 16 "
" 8	"	"	12 " " 13 "

In ordering give the No. of Cutter and Diametral Pitch required. A stock of Cutters, from 3 to 48 pitch, is kept on hand. Cutters in stock can be ordered by telegraph. Form of telegram:—
"Send 1 Cutter No. 3, 6 pitch."

SPECIAL GEAR CUTTERS:—Worm Wheel Cutters and Cutters of special dimensions are made to order at special prices. Spur and Bevel Gear Cutters, shown in lists, when ordered with special size hole, are made to order at an advance of fifty cents each on list price. If six or more of one pitch are ordered with special size hole the list price is charged.

**D 1458. METAL SLITTING SAWS.**

These are thin Milling Cutters with the sides accurately ground concave for clearance, and are hardened to cut metals.

In ordering *special* saws, please state for what purpose they are required.

Diam. Inch.	Price Each.	Thick- ness. Inch.	Hole. Inch.	Diam. Inch.	Price Each.	Thick- ness. Inch.	Hole. Inch.	Diam. Inch.	Price Each.	Thick- ness. Inch.	Hole In.
2 1-2	\$1.00	1-32	7-8	3	\$1.00	3-32	1	5	\$1.50	1-8	1
2 1-2	1.00	3-64	7-8	3	1.00	1-8	1	5	1.50	1-8	1 1-4
2 1-2	.90	1-16	7-8	4	1.45	3-64	1	5	1.50	1-8	1 1-2
2 1-2	.90	3-32	7-8	4	1.25	1-16	1	6	2.70	1-8	1
2 1-2	.90	1-8	7-8	4	1.20	3-32	1	6	3.50	3-16	1 1-2
3	1.25	1-32	1	4	1.20	1-8	1	7	3.80	1-8	1
3	1.10	3-64	1	5	1.80	1-16	1	.....	.....	.....	.....
3	1.00	1-16	1	5	1.60	3-32	1	.....	.....	.....	.....

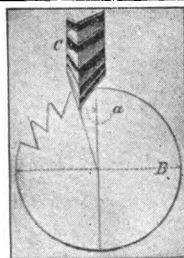
Special Saws to be used in gangs for cutting off Bicycle Sprocket Chain Links and similar purposes will be promptly made to order.

Helmet Oil
Lubricates
Anything.

**D 1459. MILLING CUTTERS.**

Cutters not included on list promptly furnished to order. Listed Cutters of one inch face and over have teeth of a spiral form.

Wid'h Face. Inch.	Price Each Cut'r.	Diam. Cut'r. Inch.	Size Hole. Inch.	Wid'h Face. Inch.	Price Each Cut'r.	Diam. Cut'r. Inch.	Size Hole. Inch.	Wid'h Face. Inch.	Price Each Cut'r.	Diam. Cut'r. Inch.	Size Hole. Inch.
1-2	\$1.75	2 1-4	7-8	4	\$6.00	2 3-4	1 1-4	1	\$4.75	3 1-2	1 1-4
1	2.50	2 1-4	7-8	6	10.00	2 3-4	1 1-4	1 1-4	5.15	3 1-2	1 1-4
1 3-4	3.30	2 1-4	7-8	11-16	2.20	2 7-8	1	1 1-2	5.60	3 1-2	1 1-4
3-16	1.30	2 1-4	1	3-4	2.30	2 7-8	1	1 3-4	6.00	3 1-2	1 1-4
3-16	1.30	2 1-2	1	7-8	2.50	2 7-8	1	2	6.40	3 1-2	1 1-4
1-4	1.40	2 1-2	1	3-8	2.10	3	1 1-4	2 1-2	6.90	3 1-2	1 1-4
5-16	1.50	2 1-2	1	7-16	2.25	3	1 1-4	3	7.40	3 1-2	1 1-4
3-8	1.60	2 1-2	1	1-2	2.40	3	1 1-4	3 1-2	8.15	3 1-2	1 1-4
7-16	1.70	2 1-2	1	9-16	2.55	3	1 1-4	4	9.15	3 1-2	1 1-4
1-2	1.80	2 1-2	1	5-8	2.70	3	1 1-4	5	10.40	3 1-2	1 1-4
9-16	1.90	2 1-2	1	11-16	2.85	3	1 1-4	6	11.90	3 1-2	1 1-4
5-8	2.00	2 1-2	1	3-4	3.00	3	1 1-4	1-2	3.90	4	1 1-4
11-16	2.10	2 1-2	1	7-8	3.30	3	1 1-4	9-16	4.10	4	1 1-4
3-4	2.20	2 1-2	1	1	3.60	3	1 1-4	5-8	4.30	4	1 1-4
13-16	2.30	2 1-2	1	1 1-4	4.00	3	1 1-4	11-16	4.50	4	1 1-4
7-8	2.40	2 1-2	1	1 1-2	4.30	3	1 1-4	3-4	4.70	4	1 1-4
1	2.60	2 1-2	1	1 3-4	4.50	3	1 1-4	7-8	5.15	4	1 1-4
1 1-4	2.90	2 1-2	1	2	4.70	3	1 1-4	1	5.65	4	1 1-4
1 1-2	3.10	2 1-2	1	2 1-2	5.20	3	1 1-4	1 1-4	6.25	4	1 1-4
1 3-4	3.40	2 1-2	1	3	5.40	3	1 1-4	1 1-2	6.65	4	1 1-4
2	3.70	2 1-2	1	3 1-2	5.90	3	1 1-4	1 3-4	7.05	4	1 1-4
2 1-2	4.10	2 1-2	1	4	6.40	3	1 1-4	2	7.45	4	1 1-4
3	4.50	2 1-2	1	5	7.80	3	1 1-4	2 1-2	8.40	4	1 1-4
3 1-2	5.00	2 1-2	1	6	10.80	3	1 1-4	3	9.00	4	1 1-4
4	5.50	2 1-2	1	1-2	3.15	3 1-2	1 1-4	3 1-2	10.00	4	1 1-4
3-8	1.70	2 5-8	1	9-16	3.30	3 1-2	1 1-4	4	11.00	4	1 1-4
7-16	1.80	2 5-8	1	5-8	3.45	3 1-2	1 1-4	5	13.50	4	1 1-4
1-2	1.90	2 3-4	1	11-16	3.65	3 1-2	1 1-4	6	15.50	4	1 1-4
9-16	2.00	2 3-4	1	3-4	3.85	3 1-2	1 1-4	3	9.00	4	1 1-2
5-8	2.10	2 3-4	1	7-8	4.35	3 1-2	1 1-4	6	15.50	4	1 1-2



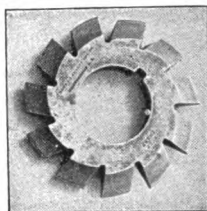
Right-Hand Cutter.

D 1460. CUTTERS FOR SPIRAL MILLS.

At factory a form of Cutter especially adapted to the cutting of spiral mills, either 53 degrees or 40 degrees one side, and 12 degrees on the other. We prefer the 53 degree angle, except for small and fine-tooth cutters. Right or left-hand cutters are carried in stock.

2½ inch diam., ½ inch thick, ⅝ inch hole, each. \$2.70

Special shaped Cutters of any angle made to order.



Right-Hand Cutter.

D 1471.

ANGULAR CUTTERS.

For cutting the teeth of cutters straight or spiral. These Cutters are kept in stock. They can be sharpened without changing their shape by grinding upon the face. Cutters are $2\frac{1}{2}$ inches diam., $\frac{1}{2}$ inch thick, and have $\frac{3}{8}$ inch holes.

Price, each.....\$0.50



Right-Hand Cutter.

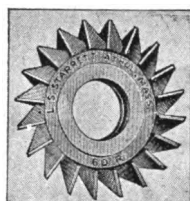
D 1472.

ANGULAR CUTTERS.

Which have Side Ground Concave.

Owing to the increasing demand for these Cutters, we carry them in stock. Angles are 40 degrees, 45 degrees, 50 degrees, 60 degrees, 70 degrees, 80 degrees, both right and left-hand. Cutters are $2\frac{1}{2}$ inches diam., $\frac{1}{2}$ inch thick, and have $\frac{3}{8}$ inch holes.

Price, each.....\$2.25



Right-Hand Cutter.

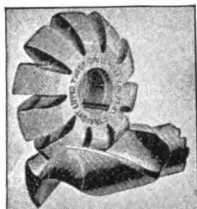
D 1473.

ANGULAR CUTTERS.

We keep in stock Angular Cutters of 40 degrees, 45 degrees, 50 degrees, 60 degrees, 70 degrees and 80 degrees angle, right and left-hand, suitable for cutting the teeth of ratchet wheels, cutters and mills.

Cutters, $2\frac{1}{2}$ inches diam., $\frac{1}{2}$ inches thick, $\frac{3}{8}$ inch hole. Price, each.....\$2.70

Cutters, $2\frac{3}{4}$ inches diam., $\frac{1}{2}$ inches thick, 1 inch hole. Price, each..... 3.00



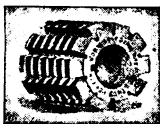
D 1474.

CUTTERS FOR**GROOVING STRAIGHT LIPPED****TWIST DRILLS.**

Parallel
Clamps
Make
Good
Drilling
Jigs.

No. Cut-ter.	Price of Cutt'r.	Diam. Drill. Inch.	Diam. Cutt'r. Inch.	Hole in Cutt'r. Inch.	No. Cut-ter.	Price of Cutt'r.	Diam. Drill. Inch.	Diam. Cutt'r. Inch.	Hole in Cutt'r. Inch.
1	\$1.50	1-16	1 3-4	7-8	12	\$3.60	3-4	2 1-4	7-8
2	1.70	1-8	1 3-4	7-8	13	3.80	13-16	2 1-4	7-8
3	1.90	3-16	1 3-4	7-8	14	4.00	7-8	2 1-2	7-8
4	2.10	1-4	1 3-4	7-8	15	4.20	15-16	2 1-2	7-8
5	2.30	5-16	2	7-8	16	4.50	1	2 3-4	7-8
6	2.40	3-8	2	7-8	17	5.00	1 1-8	2 2-4	7-8
7	2.60	7-16	2	7-8	18	6.50	1 1-4	3	7-8
8	2.80	1-2	2	7-8	19	6.25	1 1-2	3 1-2	1
9	3.00	9-16	2 1-8	7-8	20	7.00	1 3-4	3 1-2	1
10	3.20	5-8	2 1-8	7-8	21	7.75	2	3 3-4	1
11	3.40	11-16	2 1-8	7-8					

These Cutters can be sharpened by grinding without changing their form. In ordering, give number of Cutter or diameter of Drill, as by above list.



D 1475.

WORM HOBS.

We are arranged to make Hobs which have teeth relieved similar to our Formed Cutters. By this method of providing clearance, the teeth can be repeatedly ground without changing the form.

The following dimensions should be given in order:

Diameter of worm, size of hole in Hob, dimensions of key-ways, lead or number of threads to 1 inch, single or double threads, etc.; right or left hand. Prices quoted on application.

D 1486.

END MILLS.

In ordering state whether right or left-hand mills are wanted.

Left-Hand Mill.

Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper	Diam. of Mill, Inches.	Price Each.	Length of Cut, Inches.	Whole Length, Inches.	No. of Taper
1-4	\$1.00	13-16	2 7-16	4	13-16	\$2.00	1 5-8	6 15-16	9
1-4	1.15	"	3	5	"	2.10	1 3-4	5 7-8	7
5-16	2.00	7-8	2 7-16	4	"	2.25	"	7 1-16	9
1-15	1.15	"	3 1-16	5	15-16	2.10	"	5 7-8	7
8-8	1.10	"	2 7-16	4	"	2.25	"	7 1-16	9
1-20	1.20	"	3 1-16	5	1	2.15	1 7-8	6	7
7-16	1.10	5-8	2 1-2	4	"	2.30	"	7 3-16	9
1-25	1.25	"	3 1-8	5	1 1-16	2.15	"	6	7
1-30	1.30	1	5	5	"	2.35	"	7 3-16	9
1-45	1.45	1 1-8	5 1-8	7	1 1-8	2.25	2	6 1-4	7
6-16	2.35	1	3 1-8	5	"	2.40	"	7 1-4	9
"	1.50	1 1-4	5 1-4	7	1 3-16	2.25	"	6 1-4	7
5-8	1.45	"	3 5-16	5	"	2.50	"	7 1-4	9
"	1.70	1 1-2	5 3-8	7	1 1-4	2.25	"	6 1-4	7
11-16	1.75	"	"	7	"	2.55	"	7 1-4	9
"	1.90	"	6 13-16	9	1 5-16	2.75	2 1-8	7 3-8	"
3-4	1.80	1 5-8	5 1-2	7	1 3-8	2.75	"	"	"
"	1.95	"	6 15-16	9	1 7-16	3.00	2 1-4	7 1-2	"
13-16	1.90	"	5 3-4	7	1 1-2	3.00	"	"	"

Special End Mills, Hollow, Counterboring or any special Mills in this class, to order.

D 1487. STANDARD T SLOT CUTTERS.

The Cutters are made 1-32 inch larger in diameter than the figures given, to allow for sharpening. Other sizes and right-hand cutters made to order.

Left-Hand Cutter.

No. of Cutter.	Price Each.	Thickness of Cutter, Inches.	Diameter of Cutter, Inches.	Dia. Neck, Inches.	Length of Neck, Inches.	No. of Taper.
4	\$1.50	5-32	1-2	7-32	1-4	4
7	1.60	"	"	"	"	5
10	1.80	"	5-8	9-32	5-16	5
13	2.10	"	"	"	"	7 Milling
16	2.00	7-32	11-16	11-32	3-8	5 Cutters
19	2.20	"	"	"	"	7 Made for
22	2.35	"	13-16	3-8	7-16	7 Bicycle
25	2.50	"	"	"	"	9 Work.
28	2.60	9-32	15-16	7-16	1-2	7
31	2.80	"	"	"	"	9
34	3.10	13-32	1 3-16	17-32	5-8	"
37	3.45	17-32	1 5-16	21-32	15-16	"

No. of Taper (Taper is $\frac{1}{8}$ inch per foot)... 4 5 7 9
 Diameter at small end..... .35 in. .45 in. .60 in. .90 in.

Shanks Standard Taper for Brown & Sharpe Mfg. Co., Cincinnati Milling Machine Co., Garvin Machine Co., and Kempsmith machines.

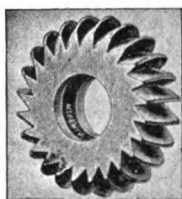
Brainard Milling Machine Co., and other Tapers, furnished.

D 1488. CUTTERS FOR MITER AND BEVEL GEARS.

Diametral Pitch.	Price each Cutter.	Diam. of Cutter, In.	Hole in Cutter, In.	Diametral Pitch.	Price each Cutter.	Diam. of Cutter, In.	Hole in Cutter, In.
4	\$5.50	3 3-8	1 1-4	12	\$2.65	2	7-8
5	1.50	3 1-16	1 1-4	14	2.55	2	7-8
6	3.90	2 3-4	1 1-16	16	2.45	1 15-16	7-8
8	3.40	2 1-2	1 1-16	20	2.30	1 7-8	7-8
10	3.00	2 1-8	7-8	24	2.10	1 3-4	7-8

These Cutters are carried in stock. Cutters for pitches not given in the above list will be made to order. Eight cutters are made for each pitch as by list of Involute Gear Cutters. These Cutters are thin enough to cut any bevel gear whose tooth face is not longer than one-third the distance from its outer end to the point where the shaft center lines meet. In ordering Cutters for Bevel Gears, if the number of teeth in each gear and the pitch are given, also the angle of the shafts, if different from a right angle, we can select the proper Cutter to send. When an extra length of face is wanted, requiring an especially thin cutter, this length should be specified in the order.

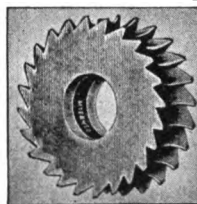
For table showing depth of space and thickness of tooth in spur wheels when cut with our Cutters, see page in back of book.



CONCAVE AND CONVEX CUTTERS

For Milling Half Circles

These Cutters can be sharpened by grinding without changing their form.



D 1499.

D 1500.

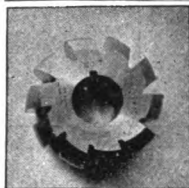
Diam. Circle Inch.	Diam. Cutter. Inch.	Size Hole. Inch.	Convex Cutter, Price.	Conc'v'e Cutter, Price.	Diam. Circle Inch.	Diam. Cutter. Inch.	Size Hole. Inch.	Convex Cutter, Price.	Conc'v'e Cutter, Price.
1-8	2	7-8	\$2.00	\$2.40	7-8	3 1-4	1	\$4.80	\$5.75
1-4	"	"	2.50	3.00	1	"	"	5.25	6.30
3-8	2 1-4	"	3.10	3.70	1 1-8	3 1-2	"	5.75	6.90
1-2	"	"	3.60	4.30	1 1-4	"	1 1-4	6.25	7.50
5-8	2 3-4	"	4.00	4.80	1 3-8	3 3-4	"	7.00	8.40
3-4	"	"	4.40	5.25	1 1-2	"	"	7.75	9.30



D 1501. SPECIAL CUTTERS FOR FLUTING REAMERS.

These Cutters have forms which admit of quick and accurate adjustment to proper position in relation to center of Reamer. The side teeth are relieved and cutters can be ground without changing the form. When ordering, give number of Cutter or diameter of Reamer as per following list.

No. of Cutter.	Price.	Diameter of Reamer, inches.	No. of Teeth.	Hole in Cutter, in.
1	\$2.00	1-8 to 3-16	6	7-8
2	2.10	1-4 " 5-16	6	7-8
3	2.20	3-8 " 7-16	6	7-8
4	2.40	1-2 " 15-16	6 to 8	7-8
5	2.70	1 " 17-16	8 to 10	7-8
6	2.90	1 1-2 " 3	10 to 14	7-8



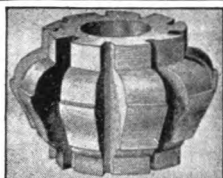
D 1502. SPECIAL CUTTERS FOR GROOVING TAPS.

These Cutters do not make as deep a groove in proportion to the width as the Tap and Reamer Cutters. They are not suitable for fluting reamers.

These Cutters can be sharpened by grinding without changing their form. In ordering, give number of Cutter or diameter of Tap, as by above list.

Number of Cutter.	Price of each Cutter.	Diameter of Taps, inches.	Diameter of Cutter, in.	Hole in Cutter, in.
1	\$2.00	0 to 1-8	1 3-4	7-8
2	2.10	5-32 " 1-4	1 3-4	7-8
3	2.20	9-32 " 3-8	1 7-8	7-8
4	2.40	7-16 " 5-8	2	7-8
5	2.70	11-16 " 7-8	2 1-8	7-8
6	3.00	15-16 " 1 1-4	2 1-4	7-8
7	3.30	1 5-16 " 1 5-8	2 3-8	7-8
8	3.60	1 11-16 " 2	2 5-8	7-8

Badger
Die Stock
Always
Cuts
Same Size.



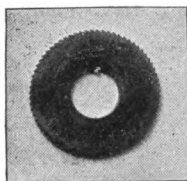
D 1503. FORMED MILLING CUTTERS.

For Milling Parts of Machinery.

These Cutters can be made in a great variety of outlines, and can be sharpened by grinding without changing their form. They are economical in the production of duplicate and interchangeable parts.

In ordering, send sketch of, or sample piece to be milled, with size of hole required, and indicate the direction Cutter is to revolve.

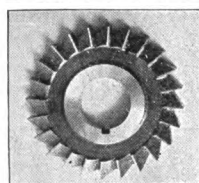
Exact duplicate Cutters can be made at any time. This is of great importance when accuracy in duplication of machine parts is required.

**D 1514.****SCREW SLOTTING CUTTERS.**

These Cutters have a fine pitch of teeth especially adapted for the slotting of screw heads and similar work.

Cutters varying from the list are made to order.

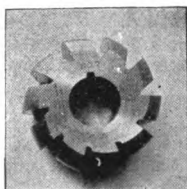
Diam. of Screw Head to be Slotted, inches.	Thickness of Cutter by Am. Standard Wire Gauge.	Price, Each.	Thickness of Cutter, inches, in Decimals.	Diameter of Cutter, inches.	Size Hole, inch.	Diam. of Screw Head to be Slotted, inches.	Thickness of Cutter by Am. Standard Wire Gauge.	Price, Each.	Thickness of Cutter, inches, in Decimals.	Diameter of Cutter, inches.	Size Hole, inch.
7-8	No. 8	\$0.60	.128	2 3-4	3-4 & 1	1-8	No. 27	\$0.15	.014	2 3-4	5-8
3-4	9	.50	.114	"	"	"	28	.15	.012	"	"
5-8	10	.40	.102	"	"	"	30	.15	.010	"	"
"	11	.35	.091	"	"	"	32	.15	.008	"	"
1-2	12	.30	.081	"	"	"	34	.15	.006	"	"
"	13	.25	.072	"	"	3-16	20	.15	.032	"	1-2
3-8	14	.20	.064	"	"	1-8	21	.15	.028	"	"
11-32	15	.15	.057	"	"	"	22	.15	.025	"	"
5-16	16	.15	.051	"	"	"	23	.15	.023	"	"
9-32	17	.15	.045	"	"	"	24	.15	.020	"	"
1-4	18	.15	.040	"	"	"	25	.15	.018	"	"
7-32	19	.15	.035	"	"	"	26	.15	.016	"	"
3-16	20	.15	.032	"	"	"	27	.15	.014	"	"
1-8	21	.15	.028	"	"	"	28	.15	.012	"	"
"	22	.15	.025	"	"	"	30	.15	.010	"	"
"	23	.15	.023	"	"	"	32	.16	.008	"	"
"	24	.15	.020	"	"	"	34	.15	.006	"	"
"	25	.15	.018	"	"	3-16	20	.15	.032	2 1-4	1-2, 5-8, 3-4
"	26	.15	.016	"	"	1-8	21	.15	.028	"	"
"	27	.15	.014	"	"	"	22	.15	.025	"	"
"	28	.15	.012	"	"	"	23	.15	.023	"	"
"	30	.15	.010	"	"	"	24	.15	.020	"	"
"	32	.15	.008	"	"	"	25	.15	.018	"	"
"	34	.15	.006	"	"	"	26	.15	.016	"	"
3-8	14	.20	.064	"	5-8	"	27	.15	.014	"	"
11-32	15	.15	.057	"	"	"	28	.15	.012	"	"
5-16	16	.15	.051	"	"	"	30	.15	.010	"	"
9-32	17	.15	.045	"	"	"	32	.15	.008	"	"
1-4	18	.15	.040	"	"	"	34	.15	.006	"	"
7-32	19	.15	.035	"	"	"	24	.12	.020	1 3-4	3-8, 1-2, 5-8
3-16	20	.15	.032	"	"	"	25	.12	.018	"	"
1-8	21	.15	.028	"	"	"	26	.12	.016	"	"
"	22	.15	.025	"	"	"	27	.12	.014	"	"
"	23	.15	.023	"	"	"	28	.12	.012	"	"
"	24	.15	.020	"	"	"	30	.12	.010	"	"
"	25	.15	.018	"	"	"	32	.12	.008	"	"
"	26	.15	.016	"	"	"	34	.12	.006	"	"

**D 1515. SIDE MILLING CUTTERS.**

Cutters varying from the following list are made to order.

Diam. inches.	Price each.	Width of Face, in.	Hole, inches.	Diam. inches.	Price each.	Width of Face, in.	Hole, inches.
2	\$2.00	3-16	1-2	3	\$2.40	1-4	1
2	2.05	1-4	1-2	3	2.50	3-8	1
2	2.10	3-8	1-2	3	2.80	1-2	1
2	2.00	3-16	5-8	3 1-2	3.50	9-16	1
2	2.05	1-4	5-8	4	4.70	5-8	1
2	2.10	3-8	5-8	5	6.00	3-4	1
2 1-2	2.15	1-4	7-8	6	8.50	15-16	1 1-4
2 1-2	2.20	3-8	7-8	6	8.50	15-16	1 1-2
2 1-2	2.25	1-2	7-8	7	17.00	1 1-8	1 1-4
2 3-4	2.30	1-4	7-8	8	23.00	1 3-8	1 1-4
2 3-4	2.30	3-8	7-8	8	23.00	1 3-8	1 1-2
2 3-4	2.35	1-2	7-8				





D 1526. TAP AND REAMER CUTTERS.

No. 1 Cutter is suitable for grooving taps 1-8 inch or less diameter; No. 2, for taps larger than 1-8 inch and up to 1-4 inch diameter, etc.

These Cutters are also adapted for fluting reamers, for which purpose it is necessary only to cut one or more grooves of a less depth in order to flute unevenly.

PRICES OF CUTTERS FOR GROOVING TAPS.

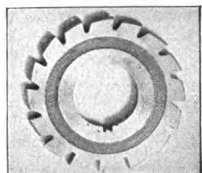
No. of Cutter.	Price, Each.	Diameter of Tap, Inches.	No. Teeth in Tap.	Diameter of Cutter, In.	Hole in Cutter, In.
1	\$2.00	0 to 1-8	4	1 3-4	7-8
2	2.10	5-32 " 1-4	"	"	"
3	2.20	9-32 " 3-8	"	1 7-8	"
4	2.40	7-16 " 5-8	"	2	"
5	2.70	11-16 " 7-8	"	2 1-8	"
6	3.00	15-16 " 1 1-4	"	2 1-4	"
7	3.30	1 5-16 " 1 5-8	"	2 3-8	"
8	3.60	1 11-16 " 2	"	2 5-8	"

PRICES OF CUTTERS FOR GROOVING REAMERS.

No. of Cutter.	Price, Each.	Diam. of Reamer, Inches.	No. Teeth in Reamer.	Diameter of Cutter, In.	Hole in Cutter, In.
1	\$2.00	1-8 to 1-4	6	1 3-4	7-8
2	2.10	9-32 " 3-8	"	"	"
3	2.20	13-32 " 1-2	"	1 7-8	"
4	2.40	17-32 " 3-4	"	2	"
4	2.40	25-32 " 1 1-8	8	"	"
5	2.70	1 5-32 " 1 3-8	"	2 1-8	"
5	2.70	1 13-32 " 1 3-4	10	"	"
6	3.00	1 25-32 " 2	"	2 1-4	"

These Cutters can be sharpened without changing their form. In ordering, give number of Cutter, or diameter and number of teeth of tap or reamer as by above lists.

D 1527. STOCKING CUTTERS FOR GEARS.	Diametral Pitch.	Price of each Cutter.	Diameter of Cutter.	Hole in Cutter.
	2	\$7.50	5	1 1-4
	2 1/4	6.75	4 1/2	1 1-4
	2 1/2	6.00	4 1/4	1 1-4
	2 3/4	5.40	4	1 1-4
	3	4.20	3 7/8	1 1-4
	3 1/4	3.90	3 3/4	1 1-4
	3 1/2	3.75	3 3/8	1 1-4
	3 3/4	3.60	3 1/2	1 1-4
	4	3.30	3 3/8	1 1-4
	4 1/2	3.00	3 1/4	1 1-4
	5	2.70	3 1/8	1 1-16
	5 1/2	2.50	2 7/8	1 1-16
	6	2.35	2 3/4	1 1-16
	7	2.20	2 3/8	1 1-16
	8	2.05	2 1/2	1 1-16



By the use of these Cutters the Stocking or roughing of gears is greatly facilitated.

D 1528. DEPTH OF GEAR TOOTH GAUGES.



Depth of Gear Tooth Gauges for all regular pitches, from 3 to 48 pitch inclusive, are carried in stock. One gauge answers for each pitch, and indicates the extreme depth to be cut.

Price, 25 cts. each. | Made to order, 75 cts. each.

D 1529. SPROCKET WHEEL CUTTERS.

We make and carry in stock a form of Sprocket Wheel Cutter for the ordinary 1-inch pitch chain. Cutters of special forms made to order.



No. of Teeth of Sprocket.	Price.	Diameter of Cutter.	Cutter. Hole in.
6	\$6.00	2 3-4 in.	1 in.
7	6.00	2 3-4 "	1 "
8	6.00	2 3-4 "	1 "
9	6.00	2 3-4 "	1 "
10	6.00	2 3-4 "	1 "
11	6.00	2 3-4 "	1 "
12 to 13	6.00	2 3-4 "	1 "
14 to 16	6.00	2 3-4 "	1 "
17 to 20	6.00	2 3-4 "	1 "

D 1540. STEEL RULES—ENGLISH MEASURE.

All Steel Rules of English Measure, Spring-Tempered, Heavy, Flexible, Semi-Flexible and Narrow, of whatever graduation, of Starrett's make, are sold at the following prices:

1 inch.....\$0.15	4 inch.....\$0.45	12 inch.....\$1.25	36 inch.....\$4.00
2 "25	6 "65	18 " 2.00	48 " 7.00
3 "85	9 " 1.00	24 " 2.50	

GRADUATIONS.

Our Rules are divided into parts of inches as follows:

Graduation.....	No. 1.	No. 2.	No. 4.	No. 7.
1st corner.....	10, 20, 50, 100	10, 20, 50, 100	64	64
2d "	12, 24, 48	12, 24, 48	32	32
3d "	16, 32, 64	16, 32, 64	16	16
4th "	14, 28	8	8	100

Also one corner, whole length, in each 10ths, 20ths, 50ths and 100ths; and one corner, whole length, in each 32ds, 64ths, 50ths and 100ths.

Our No. 303 Rules, in 2, 3, 4, 6, 9 and 12-inch lengths, of No. 4 graduation, are graduated across the end.

D 1541. SPRING-TEMPERED RULES.

Lengths, inches	1	2	3	4	6	9	12	18	24	36	48
Approximate widths, in. $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	1	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Thickness, 3-64 in. or No. 18 gauge.											



No. 300, No. 4 grad'n.	
" 301, " 1 "	
" 302, " 2 "	
" 303, " 4 " with grad. end.	
" 307, " 7 "	
" 308, g. whole l'gth, 10, 20, 50, 100	
" 309, " 32, 64, 50, 100	

No. 303 Rules are made in 2-inch to 12-inch lengths only.

D 1542. HEAVY RULES, NOT TEMPERED.

Lengths, inches	4	6	9	12	18	24	36	48
Approximate widths, inches.....	$\frac{5}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	2 $\frac{3}{4}$
thicknesses, inch.	1-16	5-64	5-64	3-32	3-32	3-32	3-32	3-32

No. 310, Heavy, No. 4 grad'n	No. 317, Heavy, No. 7 graduation.
" 311, " 1 "	" 318, " grad. whole l'gth, 10, 20, 50, 100
" 312, " 2 "	" 319, " " 32, 64, 50, 100

Prices, see D 1540.

**D 1543.****FLEXIBLE RULES.**

Lengths: 1 in., 2 in., 3 in., 4 in., 6 in., 9 in., 12 in., 18 in., 24 in., 36 in., 48 in.

These are very thin watch-spring tempered rules, nicely graduated on one side only, in either 32ds and 64ths, 64ths and 100ths, or 50ths and 100ths, whole length. Those from 1 inch to 12 inches are $\frac{1}{2}$ inch wide, and will easily conform to a 2-inch circle. Those from 18 inches to 48 inches are $\frac{3}{4}$ inch wide, and are made from a trifle heavier stock.

These rules are highly prized by watchmakers and all fine mechanics for measuring irregular surfaces.

No. 320, Flexible, graduated in 32ds and 64ths. No. 321, Flexible, graduated in 50ths and 100ths. No. 322, Flexible, graduated in 64ths and 100ths.

D 1544. SEMI-FLEXIBLE RULES.

Lengths: 1 in., 2 in., 3 in., 4 in., 6 in., 9 in., 12 in.

These rules are about 1-40 inch thick, heavier than the Flexible Rules and lighter than the Spring-Tempered Rules. They are of the same widths as the corresponding lengths of Spring-Tempered Rules.

No. 325, Semi-Flexible, No. 4 graduation.

Prices, see D 1540.

**D 1545.****NARROW RULES.**

Lengths: 4 in., 6 in., 9 in., 12 in.

3-16 inch wide. No. 18 gauge, spring-tempered, graduated one corner each side whole length, either in 32ds and 64ths, 50ths and 100ths, or 64ths and 100ths.

No. 330, Narrow, graduated in 32ds and 64ths. No. 331, Narrow, graduated in 50ths and 100ths. No. 332, Narrow, graduated in 64ths and 100ths.

D 1584.

BEVEL PROTRACTOR, No. 12.



An adjustable rule, held firmly at any point by a thumb nut, passes through a revolving turret which is nicely graduated in degrees from 0 to 90, both right and left, and can be accurately adjusted to show any angle. A valuable auxiliary is made in the shape of a small level to be attached in place of the rule removed, forming an adjustable level to show any degree, thus greatly increasing the usefulness of the instrument.

9 in.....\$3.00 | 12 in.....\$3.25 | 18 in.....\$4.00 | 24 in.....\$4.50
Protractor Head only \$2.00.

The blades are the same as those used in our No. 11 squares. Those of No. 4 graduation will be sent unless otherwise ordered. The head is 7 inches long.

No. 12½ is a Protractor similar to No. 12. The blade is ⅝-inch wide, and the head 5 inches long. Made only in one size, 9 inches. | Price.....\$3.00

D 1585. IMPROVED BEVEL PROTRACTOR, No. 12M.

With blades graduated in the Metric System.

20 C. M....\$3.00 | 30 C. M....\$3.25 | 45 C. M....\$4.00 | 60 C. M....\$4.50

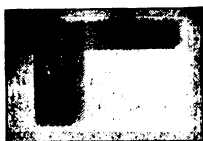
PRICES OF SEPARATE PARTS—PROTRACTORS, No. 12 AND No. 12M.

Prices of scales, same as for corresponding sizes of No. 11 and No. 11M.

Price of Head, with Level.....\$2.00 | Price of Level alone.....\$0.25

NOTE.—For directions in ordering separate parts, see page 158.

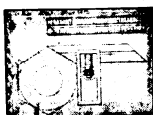
D 1586. STARRETT'S PATENT DOUBLE SQUARE, No. 13.



4 Sizes.

This Square is conceded the most practical one for machinists and fine tool-makers' use ever offered. The sliding scale, shortened or extended full length, makes it more valuable than a full set of the common kind, while with the extra bevel blade, shown in the following cut, we have both the hexagon and octagon angles. The seat against which the blade is clamped being convex, should corners of the blade get injured, the accuracy of the square is not affected.

4 inch.....\$1.25, with both blades, \$1.65	Both blades with 4 and 6 inch always sent unless otherwise ordered.
6 " 2.00, " " " 2.50	
9 " 3.00,	
12 " 4.00,	

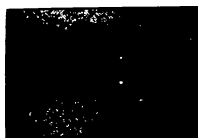


This cut represents the 4 inch and 6 inch double square, with hexagon end of blade applied. Reverse it and the octagon is in position for use. Bevel blades are made to fit only 4 inch and 6 inch sizes.

Parallel
Clamps
Hold
Work
True.

D 1587.

PATENT DOUBLE SQUARE, No. 13M.



The same as No. 13, except that the blades are graduated in the Metric system.

10 C. M.....\$1.25, with both blades, \$1.65
15 " 2.00, " " " 2.50
20 " 3.00
30 " 4.00

PRICES OF SEPARATE PARTS—SQUARES, No. 13 AND No. 13M.

	Scale.	Stock.	Beveled Blade.
4 inch or 10 C. M.....	\$0.50	\$0.75	\$0.40
6 " 15 " .....	.75	1.25	.50
9 " 20 "	1.00	2.00	....
12 " 30 "	1.25	2.75	....

NOTE.—For directions in ordering separate parts, see page 158.

D 1588.

CENTER GAUGES.



No. 390. Not tempered.....	\$0.25
No. 391. Spring-Tempered.....	.40
No. 395. Whitworth, not tempered.....	.25
No. 396. " Spring-Tempered.....	.40

D 1614. DRAUGHTSMEN'S T SQUARE.

The heads are made of aluminum, weighing only from 4 to 6 ounces, and the blades of spring-tempered steel, all nicely finished and warranted accurate.



No. 16.	Head 8 in. lg.	blade 20x1 in.,	3-64 in. th'k,	\$3.00
No. 18.	" 8 "	" 24x1 "	3-64 "	3.50
No. 19.	" 10 "	" 36x1 1/4 "	3-64 "	5.00
No. 48.	" 10 "	" 48x1 1/4 "	3-64 "	6.50

D 1615. THIN STEEL TRY SQUARES, No. 21.

For Machinists and Draughtsmen.



2 in., 1-20 in. thick, grad. 16 and 64 one side,	
32 and 64 other	\$1.00
3 in., 1-20 in. thick, grad. 16 and 64 one side,	
32 and 64 other	1.50
4 in., 1-16 in. thick, g. 16ths and 32ds both sides	2.00
6 " 1-16 " "	3.00

D 1616. THIN STEEL TRY SQUARES, No. 21M.

The same as No. 21, except that the graduation is in the Metric system.

5 C. M.	\$1.00	10 C. M.	\$2.00	15 C. M.	\$3.00
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D 1617. STARRETT'S PATENT INCLINOMETER, No. 10.



The cut represents an Inclinometer, try square and bevel protractor combined. It is compact, convenient, and a complete and perfect substitute for several costly tools.

It consists of a stock and disc, both slotted to receive the blade, which folds in the stock. The blade attached to the graduated rotary disc may be secured at any angle from 0 to 90 degrees, and by loosening the clamp screw it may be shortened or extended full length, or removed for a straight edge.

The working face of the stock, extending both sides of the blade, admits of its being reversed, so that the same angle may be laid off in opposite directions *without changing* the angle in the tool, thus requiring but 1/4 of a graduated circle to obtain all angles both ways.

At 90 degrees, the blade brings up against a case-hardened screw, accurately adjusted, thus forming a TRY SQUARE; by holding the blade perpendicular (the level in the stock being at right angles), a PLUMB; by folding the tool, a LEVEL, length of blade. Open it to any degree and work may be leveled to that incline

With 12-in. blade..	\$5.00	With 18-in. blade..	\$6.00	With 24-in. blade..	\$7.00
Center head, to fit all sizes, \$0.75					

PRICES OF SEPARATE PARTS, INCLINOMETER, No. 10.

	Scale.	Stock.	Center Head.
12 inch.....	\$1.50	\$3.50	\$0.75
18 "	2.50	3.50	.75
24 "	3.50	3.50	.75

NOTE.—For directions in ordering separate parts, see page 158.

Bonanza
Oil Cups
are Good

D 1618. STARRETT'S RELIABLE TRY SQUARES, No. 60.

Graduated Blade, Not Hardened.



Starrett's Reliable Try Squares, Nos. 60, 61 and 62, represent a new line of Try Squares, handsome in design, light and convenient. The blade is not riveted or soldered to the stock, but is firmly held by our patent bolt or nut, by means of which the tool can be readily taken apart, and when worn the blade and stock can be reground or lapped, and put

again together as good as new.

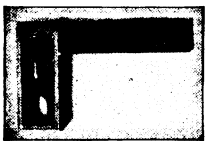
Length of Blade, inches.....	4	5	6	9	12
Length of Beam "	2 5-16	3	3 5-8	5 1-16	6
Price	\$1.00	\$1.15	\$1.25	\$2.00	\$2.75

D 1619. STARRETT'S RELIABLE TRY SQUARES, No. 61.

Blade with Hardened Edge, Not Graduated.



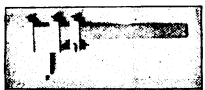
Length Blade, in..	4	5	6	9	12
Length Beam, "	2 5-16	3	3 5-8	5 1-16	6
Price	\$1.25	\$1.50	\$1.75	\$2.25	\$3.00



**D 1630. STARRETT'S RELIABLE TRY
SQUARES, No. 62.**

Blade with Hardened Edge, Graduated.

Length Blade, in.	4	5	6	9	12
Length Beam, "	2 5-16	3	3 5-8	5 1-16	6
Price	\$1.75	\$2.25	\$3.00	\$5.00	\$7.00



D 1631. CALIPER SQUARE. No. 25.

An improved tool for both outside and inside measure. The beam is nicely graduated, 64ths on one side, 100ths on the other. Dies

For close work this is a reliable tool.

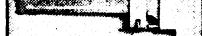
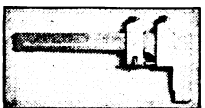
3 inch, with adjusting screw.....	\$3.50	without.....	\$3.00	Shapes and Threads, Made to Order.
4 " " " ".....	4.00	" " " ".....	3.25	
6 " " " ".....	5.50	" " " ".....	5.00	
With hardened jaws, extra, \$1.50				

With hardened jaws, extra, \$1.50

**Dies,
Special
Shapes
and
Threads,
Made to
Order.**

D 1632. MICROMETER CALIPER SQUARE, No. 28.

For Outside and Inside Measure.



This instrument is invaluable, as it enables one to enlarge or decrease work one or more thousandths from that calipered, and fills the bill for both a first-class caliper square and micrometer of large scope and quick adjustment. The jaws are $1\frac{1}{2}$ inches long, hardened, and open four inches. One side of the beam is graduated in 64ths and the other in 40ths; and either side may be used as a common caliper square, or, through the micrometer, to show 1,000ths full length, on either inside or outside work. This is done by first setting the indicator mark on the movable jaw to agree with any division nearest the size wanted. Fasten it there, slack binding clasp and turn the micrometer nut to agree with indicator mark on the clasp; now tighten this, slack movable jaw and turn micrometer nut, counting 1,000ths, adding to or taking from the division shown on beam at the starting point.

An excellent feature of this instrument is the spiral spring between jaw and clasp, which not only takes up all back-lash, but limits the pressure against the work to strength of spring. This is instantly felt through released pressure on the nut, and prevents springing the jaws, thus calipering to a nicety.

In Leatherette case.....	\$8.75	Without case	\$8.00
Sent with case unless otherwise ordered.			

D 1633. STARRETT'S SPEEDED SCREW MICROMETER, No. 3.



This cut represents an improved Micrometer with a small knurled thumb piece on the operating end of the spindle, by means of which its rotation is speeded (about three to one) by the action of the thumb and finger between which it is made to rotate.

A further improvement in this Micrometer (saving the necessity of splitting the barrel to take up wear in the nut, with openings for dirt to get through, as in other makes), consists in a bushing running through full length of the barrel, and firmly secured therein, said bushing being chambered in middle, inside, and each end tapered outside, both ends being split in three sections nearly half the length. One end is threaded inside for the screw, the other smooth to fit spindle. A knurled nut, threaded on the outside, is screwed to each end of the barrel, telescoping the ends of bushing, one to take up wear and cause a close fit between the screw and nut, the other to contract the bushing to a close fit on the spindle, or by a slight turn of the nut, lock firm, thus making a solid gauge when desired, which for reliability has no equal.

Price\$6.00 | In Leatherette case.....\$6.50
Sent with case unless otherwise ordered.

D 1634. MICROMETER. No. 113.

This Micrometer is the same as No. 3, except it is graduated to read to ten-thousandths of an inch as well as thousandths.

Price\$7.00 | In Leatherette Case\$7.50



D 1645. STARRETT'S SPEEDED SCREW MICROMETER. No. 2.



The same as No. 3, except that it is for measurements from 1 inch to 2 inches.

Price.....	\$6.50
In Leatherette Case.....	7.00

Sent with case unless otherwise ordered.

D 1646. SPEEDED SCREW MICROMETER, No. 3M.



The same as No. 3, except that it is graduated to measure in the Metric System. **Helmet Bronze**
 Price.....\$6.00

In Leatherette Case.....	6.50	Makes Strig
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Sent with case unless otherwise ordered.

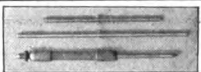
**Helmet
Bronze
Makes
Stiff
Springs.**

D 1647. U. S. STANDARD METAL PLATE MICROMETER AND WEIGHT INDICATOR, No. 86.



our No. 5—speeded screw, closed barrel and locking device.
 Price.....\$6.50 | Price, in Leatherette Case.....\$7.00
 Sent with case unless otherwise ordered.

Sent with case unless otherwise ordered.



Made in two sizes, 2 inch and 8 inch.

D 1648. Both have screw and nut the same as our improved No. 3 Micrometer Caliper and read in thousandths. The smaller one measures from 2 inches to 8 inches and has $\frac{1}{2}$ inch movement of screw and has four extension rods. The rods are provided with a hardened steel adjustable anvil in ends which permits adjusting for wear. A small binding screw locks rod when set. Rods are finely marked in $\frac{1}{4}$ -inch divisions and set to a similar line on a projection of the barrel. The larger tool is similar in all respects, with the exceptions that it measures from 8 inches to 28 inches with three extension rods, and has a lock for screw as well as rods. This is a very strong and serviceable tool as well as an accurate one.



D 1649. We can furnish rods of extra lengths for these tools or a special large one to measure from 26 inches to 48 inches.

ometer with 4 rods to measure from 2 in. to 8 in., in case.....	\$ 4.00
“ “ 3 “ “ “ 8 “ 28 “ “	6.00

Set of two Micrometers, 2 in. to 8 in. and 8 in. to 28 in., in case.....	10.00
Special, with 1 rod from 26 in. to 48 in., without case.....	6.00

Extra rods at 5 cents per inch.

Extra rods at 5 cents per inch.

D 1650. STARRETT'S ADJUSTABLE CALIPER GAUGE, No. 125.



Made from steel throughout, and nicely finished.

3 in. with two rods, capacity from 3 in. to 6¾ in.	\$1.00
6 " " three " " " 6 " 16 "	1.25

The diameter of the steel rods is .150 in. Extra rods furnished at 1c. per in.

The diameter of the steel rods is .150 in. Extra rods furnished at 1c. per in.

D 1651. PIPE ATTACHMENT. No. 71.



The cheapest pipe attachment for monkey-wrenches made. The cylinder, of hardened steel, rolls in between the jaw of the wrench and any round iron or pipe to grip it firmly. Price, $\frac{3}{8}$ inch.....\$0.25

D 1662. MICROMETER INTERNAL CALIPER GAUGE, No. 126.

Designed for close internal measurements where a definite distance in inches is of no importance. The body of the tool is a steel tube, provided at one end with a binding chuck in which are fastened the plain rods and can quickly be adjusted to any approximate size. The other end has sleeve and

body of barrel marked and graduated same as our No. 3 Micrometer Caliper, giving a reading in thousandths and has $\frac{1}{4}$ inch movement of screw. Anvil in end of sleeve is hardened as are those in ends of rods.

No. 126 with 2 rods, capacity 3 to 6 in., \$2.00 | Extra rods at 1 cent per inch.

D 1663. STARRETT'S UNIVERSAL BEVEL PROTRACTOR, No. 360

This tool weighs six ounces. The blade is 7 in. by $\frac{1}{2}$ in., the stock 4 in. long, and both are made from sheet steel, nicely finished. The disc is graduated in degrees from 0 to 90 each way, and rotates the entire circle on a central stud inside the case. The blade (clamped by an

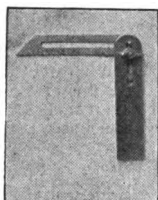
eccentric stud against the edge of the disc) may be slipped back and forth its full length, or turned at any angle around the circle and firmly clamped at any point, adapting it for work in positions where others cannot be used, and rendering the common universal bevel (for transferring angles) unnecessary. One side of the stock being flat, makes it a convenient tool for laying on paper in drafting, etc., and it has double the utility of any other tool of the kind.

7 inch.....	\$5.00	12 inch.....	\$6.00
In Leatherette Case, 7 in., extra..	.75	With both 7 and 12 inch blades...	6.50
12 in., extra.	1.00		

D 1664. UNIVERSAL BEVEL, No. 15.

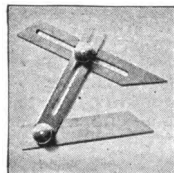
Improved features. The set-off in the blade increases its capacity and usefulness for bevel gear work, etc., so that any angle, however slight, may be obtained. Another valuable feature is, one edge of the case being solid, forms a rest directly under the blade, where thin templates may be placed and accurately fitted.

Price, 3 inch.....\$1.50

D 1665. IMPROVED BEVEL, No. 47.

The advantages of this Bevel over any other tool of this kind made, consist in its having not only the blade slotted but the stock as well, through and through, thus admitting adjustments that cannot be obtained with a common bevel. The clamping screw head, which the cut does not show, is let into a rabbet flush with the surface of the stock, which will lie flat on the work.

6 inch.....	\$1.25	Taps and Dies Made to Any Degree of Accuracy.
9 inch.....	1.50	
12 inch.....	1.75	

D 1666. STARRETT'S COMBINATION BEVEL, No. 49.

This Bevel, as will be seen, has a stud riveted in the straight edge stock or head, on which its split blade is hinged, so as to swing over the stock, and by the knurled nut clamped at any angle, adapting it for laying out work, in a very simple manner. The slotted auxiliary blade with clambolt, may be slipped on to the split blade and be clamped at any desired angle and used, in combination with the stock of the other, for laying out work, measuring, or showing any angle desired, and, when so com-

bined, will lie flat upon its work. Price, 6 inch.....\$2.00

D 1667. STARRETT'S SCRATCH GAUGE, No. 29.

This Gauge is made of steel with hardened cast steel head. Through it is a split bushing, against which the set screw acts to hold it firm. The beam is graduated in either 50ths or 64ths of an inch. The marker is a thin square piece of steel, nicely tempered, which is firmly held against the end of beam, presenting four marking points.

5 inch (beam 15-64 inch).....	GRADUATED. \$1.00	NOT GRADUATED. \$0.65
6 " " 5-16 "	1.25	.75

Unless otherwise ordered, we shall send those graduated in 64ths.

Two extra cutters will be sent with each gauge, fastened to the case.

D 1678. IMPROVED SCREW PITCH GAUGE, No. 40.



This Gauge has twenty pitches, viz.: 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40. This is the only gauge made not infringing our patents that can be used inside a nut as well as on the outside of a screw or bolt.

A late improvement in our Screw Pitch Gauge consists in stamping on each leaf decimals, showing the double depth of thread on said leaf, and this of course equals the depth of threads on the two sides of a tap having the same pitch, and helps the workman to determine the size of drill needed to drill the hole the right size to leave a full V thread for a tap having the same pitch. To do this, caliper with a micrometer over the threads of the tap, and from its size in thousandths shown, deduct the decimals given on the pitch gauge leaf, agreeing with the pitch of the tap. The result will show in thousandths the size of drill needed for a full thread. An allowance is to be made for the extent to which it is desired the thread should be flattened.

A further improvement has recently been made in reducing the width of the leaves having the finer pitches, so that they will enter small nuts.

Formula for depth of threads for a V Thread: $d-D-\frac{1.733}{N}$

For U. S. Standard: $d-D-\frac{1.299}{N}$

Gardner
Opening
Die
Head
Cuts
Exact
Threads.

D—Outside diameter of tap. d—Bottom diameter of tap. N—Number of threads per inch.

D 1679. SCREW PITCH GAUGE, No. 11 1-2.

For pipe and brass work. This gauge is the same as No. 40, except that pitches 8, 11½ and 27 are substituted in place of 36, 38 and 40. Price, \$1.00.

D 1680. SCREW PITCH GAUGE, No. 4.

24 Pitches, 4 to 30



Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30. The teeth are sharp and clean cut. Like our No. 40 and No. 11½, it can be used inside of a nut as well as on outside of a screw or bolt. It is also a convenient and reliable tool to use as a 60-degree center gauge and gauge to test the grinding of either an inside or outside threading tool. Price\$1.25

D 1681. SCREW PITCH GAUGE, No. 5.

26 Pitches, 32 to 82.



Of the same form as our No. 40 Screw Pitch Gauge, for inside and outside work. Has the following pitches: 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82. Price\$1.25

D 1682. SCREW PITCH GAUGE, No. 6.

30 Pitches, 4 to 42.



Of the same form as our No. 4 Screw Pitch Gauge. Has the following pitches: 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42. Price\$1.50

D 1683. WHITWORTH SCREW PITCH GAUGE, No. 7.

20 Pitches, 4 to 30.



For Whitworth Standard Thread Only.

This Gauge has twenty pitches, viz.: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 25, 26, 28, 30. Price\$1.25

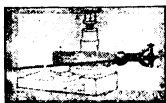
D 1684. THICKNESS GAUGE, No. 72.



A new tool designed to meet a long-felt want by tool-makers and mechanics in general. Made similar to a Screw Pitch Gauge; having 22 leaves of finely tempered steel of varying thicknesses of from .004 to .025. Mechanics will find this a very useful tool in lining up between planed surfaces, setting planer tools and in making finer adjustments of working parts of machinery, etc. Price\$1.25

D 1694.

CENTER TESTER, No. 65.



This instrument was designed for use in adjusting and locating centrally any point or hole in a piece of work operated upon in a lathe chuck or on a face-plate; also to test the truth of lathe centers or a shaft between the centers, the instrument being held in the tool post. The Tester is of improved design and nicely made. The indicating needle passes through the ball, having a split stem, forming a chuck for holding the needle adjusted to any desired length. The ball is pivoted to form a universal joint, but may be instantly converted into a single joint for a tilting motion by only tightening the knurled nut, adapting it for both inside and outside surface contact. A steel bead, not shown in the cut, and carried on the needle, slips over the point of same when used for inside work. The instrument is joined to a tool-post shank by a flexible steel ribbon with sufficient spring to properly hold the needle in contact with the work. It is a tool needed in every up-to-date tool-room. | Price, \$3.00

D 1695.

COMBINATION STRAIGHT EDGE, No. 167.



The needle carriers at each end swing on taper studs, and carry needle-pointed brads frictionally held in their split ends. These may be swung to bring the points close to the working edge, and by a slight turn of a knurled nut may be rigidly locked, holding the straight edge bradded to the paper. Using one brad secured at the working edge and swinging the jointed arm, see cut No. 165 (the protractor being removed), over against the straight edge to form a corner to place pencil, circular lines may be struck any desired size, and radial lines drawn to perfection. The straight edges, either graduated or plain, will be furnished with the brad carriers without the other attachments, or with any or all of them, making a complete set—the different lengths governing the price. Those having use for the set will highly appreciate it. They are also furnished plain, without carriers.

18 in. long, $1\frac{1}{4}$ wide, not graduated,	\$2.25	Graduated,	\$3.00	Extra needle
24 " " " " " "	2.75	"	3.50	points, 30c. per
30 " " " " " "	3.50	"	4.75	dozen; extra
36 " " " " " "	4.25	"	5.50	needle holders,
42 " " " " " "	5.00	"	6.75	10c. each.
48 " " " " " "	5.75	"	8.00	

In ordering extra needle holders, mention the width of straight edge blade.

D 1696. PLAIN STRAIGHT EDGES, No. 169.

These are of spring-tempered steel, No. 18 gauge, same width as No. 167.

18 inch, plain,	\$1.50	Nickeled,	\$1.75	36 inch, plain,	\$3.00	Nickeled,	\$3.50
24 " " "	2.00	"	2.40	42 " " "	3.75	"	4.25
30 " " "	2.50	"	3.00	48 " " "	4.50	"	5.25

D 1697.

ADJUSTABLE METAL EDGE, No. 168.

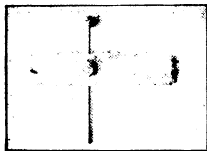


We furnish a metal T rail, or straight edge with attachments to secure it to end, or end and side of draughting board or table. These are ground perfectly straight and are nickel plated. The T square used against this insures more accurate results than could be obtained by working against a wooden board or table.

16 inch, \$1.35	18 inch, \$1.50	19 inch, \$1.60	20 inch, \$1.70	21 inch, \$1.80
23 " 1.90	24 " 2.00	26 " 2.20	27 " 2.30	28 " 2.40
30 " 2.50	32 " 2.65	34 " 2.85	36 " 3.00	38 " 3.20
40 " 3.35	48 " 4.00	60 " 5.00		

D 1698.

STARRETT'S DEPTH GAUGE, No. 45.

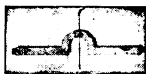


The wire in this Gauge is held to a groove by a friction spring inside the nut while adjusting, and may be used close to the end as well as in the middle of the straight edge. By loosening the nut, the Gauge may be neatly folded.

Price, with 4-inch stock	\$0.75	Malleable
" " 6 " "	1.15	Thumb
" " 10 " "	1.35	Screws
		Carried in
		Stock.

D 1699.

LOCOMOTIVE GUIDE LINER, No. 66.



This instrument was devised after many urgent requests from intelligent mechanics, there having been nothing of the kind on the market. The lightness of this tool, combined with strength and accuracy, together with an adjustable level in each end, adapting it to be used either side up, and the convenient way of adjusting the pointer, all go to make it just the thing needed. Length over all, 14 inches; span of arch, $3\frac{1}{4}$ inches. Price.....\$2.50

D 1710.

PROTRACTOR.



No. 165.

Cut No. 165 shows the Bevel Arm and Protractor. No. 165½ shows the same and Section Liner as applied to No. 167 Straight Edge. The Protractor Arm is jointed to a clasp which slides on the Straight



No. 165 1-2.

Edge or may be locked to it at will. This may be set at angle (either way), and the joint locked by a slight turn of the knurled disc forcing it together. The Protractor is ¼ of a 14-inch circle, and is graduated as fine as quarter degrees. This by steady pins, accurately fits (either side up) the jointed arm. Reading by the edge of the blade, the arm may be set to any degree, or finer as desired, and the Protractor removed so as not to obstruct the work. An improved Section Liner is provided, attached to the clasp (see larger cut of this, No. 166). This is in the form of a knuckle joint, and feeds either way against the graduation marks cut in the surface of the Straight Edge or T Square. By thumb pressure on the button-headed screw, which may be adjusted to a fine or coarse movement, hatching may be rapidly and evenly done, and for accurately spacing work for draughting to the scale of 1-16, 1-8 or 1-4 to foot, the device is a great convenience. Pressing the button two or more times, any desired distance can be quickly and evenly spaced off, and with the assurance that no mistake is made, as is liable when other means are employed.

Protractor only.....	\$5.00	Long auxiliary blades	
Jointed Blade, 15-inch,	5.00 with Protractor, \$10.00	for interchangeable use,	
“ “ 24 “	6.00 “ “	with clasp, are supplied,	
“ “ 36 “	7.00 “ “	24 inch.....	\$2.00
With Section Liner....	2.50 extra.	36 “	2.50

D 1711.

STARRETT'S SECTION LINER, No. 166.

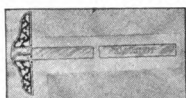


This cut shows the Section Liner more plainly than cut No. 165½. This is hinged to the clasp connected with jointed blade. Its hardened steel dog feeding against the graduation marks in the center of spring-tempered square blade or straight edge moves it with

uniform evenness as fine or coarse as desired, the throw being regulated by turning the adjusting nut. It should be understood that the Section Liner can only be used in connection with our graduated T square blades and combination straight edges, etc. With these it is a wonderful help to the draughting fraternity. Price.....\$2.50

D 1712.

IMPROVED T SQUARE, No. 164.— Graduated or Plain.

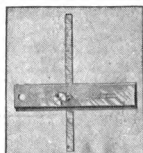


Cut No. 164 represents a nickel-plated T Square, with spring tempered blade and aluminum head, weighing only about five ounces, and has an automatic clamping device to hold it by spring pressure against a metal straight edge attached to the end, or end and side, of a draughting board or table (see description of Metal Edge, No. 168), or, by a slight turn of the knurled nut, locked firm. The top side of the blade graduated forms a scale to set dividers, etc., and a feed rack, for Section Liner to work against, to move jointed blade (as shown in cut No. 165½ used with Combination Straight Edge). The Square will be furnished plain or graduated.

22x1¼-inch blade, 10-inch head, not graduated, \$3.50 Graduated, \$4.25
 26x1¼ “ “ 10 “ “ “ “ 4.25 “ 5.00
 32x1¼ “ “ 10 “ “ “ “ 5.00 “ 6.00
 36x1¼ “ “ 13 “ “ “ “ 5.75 “ 7.00
 42x1¼ “ “ 13 “ “ “ “ 6.50 “ 8.00
 48x1¼ “ “ 13 “ “ “ “ 7.50 “ 9.50

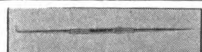
D 1713.

STARRETT'S DEPTH GAUGE, No. 46.



Has in place of the round wire to slide in the groove, as shown with No. 45, page 166, a 4-inch scale, 3-16 inch wide, graduated in either 32ds and 64ths, 50ths and 100ths, or 64ths and 100ths, indicating exact measurements, and may be used separately from the Gauge.

Price, with 4-inch stock.....	\$1.25	Malleable
“ “ 6 “ “ “ “ “	1.50	Thumb
“ 6-inch stock with 6-inch blade.....	1.75	Screws
“ 10 “ “ “ 6 “ “	2.25	Carried in Stock.



D 1714.

SCRIBER, No. 67.

This Scriber is made to please mechanics wanting a better thing



D 1715.

than heretofore obtainable. The points are made from fine steel, nicely tempered. The knurled stock is of sufficient size to be easily held without cramping or turning in the fingers. The long Scriber, shown in cut, will be found a valuable auxiliary for reaching through holes, etc. All parts are interchangeable. Price, including long Scriber, 45c.; without, 35c. Sent complete unless otherwise ordered.

SURFACE GAUGE, No. 52.



This Gauge with improvements as made for a few years past, gives great satisfaction to all who use it.

The sleeve and needle clasp, when loosened for adjustment, are both held by a slight spring friction, and by a single knurled nut, *both* are rigidly clamped. For fine adjustment, the spindle in the base is raised or lowered by a knurled nut, and all backlash is taken up by a spiral spring in the base.

For above 12-inch lengths, an extension is provided to couple on to the spindle.

8 inch.....	\$2.00	12 inch.....	\$2.75
12 inch with 6-inch extension..	\$3.25	Sleeve alone.....	1.00

D 1726. STARRETT'S MICROMETER SURFACE GAUGE, No. 53.



This Gauge has a turned and polished base, a micrometer adjusting nut reading 1,000ths, and a six-inch extension for the spindle. By means of springs and taper fitting parts of the sleeve (not shown in cut) the scriber is held by slight friction in any position while adjustments are made, and firmly held by a turn of the nut. A knurled cam on the base releases and locks the spindle for adjusting.


8 inch, without extension.....	\$2.50
12 " " " "	3.50
12 " with "	4.00

**We Cut
Sheet
Brass
Special
Sizes to
Order.**

In ordering, give the size wanted.

D 1727. SURFACE GAUGE ATTACHMENT. No. 54.



 To be used between the centers of the lathe to adjust, locate and lay out work secured to the faceplate. An auxiliary arbor is supplied size of No. 53 Surface Gauge, 12-inch Spindle, the sleeve fitting both spindle and arbor.

Those having the Surface Gauge will need the arbor only.

Price of the Auxiliary Arbor...\$0.50 | Complete.....\$1.50

D 1728. STARRETT'S UNIVERSAL SURFACE GAUGE. No. 55.



This Gauge has the following improved features, viz.: A joint at the base which allows the spindle and scriber to be moved back and forth and placed in any position from upright to horizontal to reach over, back of and under work that could not be got at with old style gauges, while by inclining the

spindle over the work its scope for long reach is increased. The fine adjustment is nicely obtained by the knurled screw in the rocking bracket at the base acting against a stiff spring under the opposite end, while the joint above with the spindle may be set and rigidly held in any position desired. Two pins through the base, frictionally held, may be pushed down by slight pressure to form a bearing to work from the edge of, or in the slots of, the planer bed for lining up work, while the weight of the gauge against the bed with a little pressure is sufficient to push them back. Grooves around these pins, against which a pointed spring plunger presses, insure their being held in place either up or down. Concave depressions milled in the sides of the base make it convenient for thumb and finger to grasp.

This Gauge is furnished with our improved sleeve which rigidly holds the scriber. The Gauge is nicely made in two sizes, with spindles of extra length to order.

9 inch.....	\$2.50	12 inch	\$3.00
-------------	--------	---------------	--------

With two spindles 12 and 18 inches.....	\$3.50
---	--------

Extra spindles of any length furnished at a rate of 3c. an inch.

D 1729. TOOL-MAKERS' UNIVERSAL SURFACE GAUGE, No. 56.



This little tool fills the bill for a gauge adapted for light work. It is made on the principle of our new No. 55. The base is steel, nicely finished and *case-hardened*, with depressions milled in the sides for the thumb and finger to grasp. The top side of it is slotted, and the rocking bracket is pivoted in the same. There is a stiff spring under one end of the bracket and a knurled adjusting screw in the other; the spindle jointed to this may be set and rigidly held in any position from vertical to horizontal, and the scriber placed in

position to be used below its base for Depth Gauge, or (with bent end down) as a Scribing Gauge. It weighs but 11 ounces and is 5 inches high, and, folding the spindle (which is 4 inches long) horizontally over the base, it may be packed in 13x1½x4 inches in the tool chest. Price.....\$3.00



D 1740.

THE WELLES PATENT SURFACE GAUGE, Style No. 1.

10 inches usual height, 18 inches when extended.

Price, Style No. 1.....\$3.75

D 1741.

BILLINGS' PATENT SURFACE GAUGE.



The hundreds of uses of the Surface Gauge in modern mechanics make every improvement in its construction and adaptability of value to the practical, exact mechanic. One of the inconveniences of the ordinary Surface Gauge has been that, to set it exact, dependence has been made wholly on the adjustability of a set screw, which demanded repeated trials on the "cut and try system." It is evident enough that it is possible to change this trial method to that where positive exactness shall be the rule, so that the carrying arm of the gauge points shall be as easily adjusted to exactness as the jaws of the spring calipers. The Surface Gauge is drop-forged of bar steel, and finished in a thorough manner, and hardened. It is much of the usual style, except the employment of two sliding snugs, connected by a screw encircled by an open spiral spring. The upper snug is split, and is held in place at any position on the upright standard by means of a simple thumb nut that clamps the split snug on the standard. The lower snug carries the marking points, consisting of a piece of steel wire, which are held in the usual way by means of a thumb nut on a clamping screw. In operation, any movement, up or down—along the line of the standard—or around its circumference, of the upper snug, will, of necessity, be accomplished by the lower snug in consequence of the connection of the screw; but the lower snug may be raised or be lowered by the connecting screw acting with the spiral spring, so that, while the upper snug is held firmly in place by its binding screw, the lower snug, carrying the points, may be carefully and exactly adjusted to surface measurements, and when in position the tension of the spring and friction of the screw will hold the points exactly where they have been adjusted.

8-inch Standard.....\$2.75 | 12-inch Standard\$3.00



D 1742.

STEVENS' SURFACE GAUGE, No. 59.

8 inch.....\$2.00

12 " 2.75



D 1743.

STEVENS' MICROMETER SURFACE GAUGE, No. 59 1/2.

6-inch, each.....\$1.50

8 " " 3.00

Try our
Brush
Copper for
Electrical
Work.



D 1744.

STEVENS' BENCH SURFACE GAUGE, No. 58.

Price, each.....\$2.00



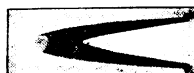
D 1745.

STEVENS' TOOL-MAKERS' SURFACE GAUGE, No. 60.

Price, each....\$2.50



OUTSIDE AND INSIDE CALIPERS.



D 1746. Outside Caliper.

Size, inches..... 2 3 4 5 6 8 10 12 15 18 21 24

D 1746 or D 1747,

Per dozen.....\$2.25 2.60 2.90 3.15 3.50 5.25 6.50 7.25 16.00 20.00 25.00 30.00

D 1746 or D 1747, ea. .25 .30 .30 .35 .35 .55 .65 .75 1.60 2.00 2.50 3.00

D 1747. Inside Caliper.





EUCLID CALIPERS.



D 1758. Single Caliper.

Size, inches.....	5
D 1758. Price, each.....	\$0.60
Size, inches.....	.....
D 1759. Price, each.....	.....

D 1759. Double Calipers.

7	9	12
\$0.75	\$0.90	\$1.20
5	6	
.....	\$0.70	\$0.80



DOUBLE AND NAVY CALIPERS.



D 1760. Double Caliper.

Size, inches.....	3
D 1760. Price, each.....	\$0.35
D 1761. Price, each.....	.40

D 1761. Navy Caliper.

4	5	6
\$0.50	\$0.55	\$0.65
.....



D 1762. Leg Caliper.

Size, inches.....	3
D 1762. Price, each.....	\$0.35
D 1763. Price, each.....	.....



D 1763. Arm Caliper.

2½	3	4
.....	\$0.40	\$0.55
\$0.35	.....	.....



KEYHOLE CALIPERS.

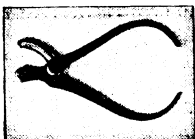


D 1764. Outside Caliper.

Size, inches.....	5
D 1764 or D 1765. Price, each.....	\$0.55

D 1765. Inside Caliper.

7	9	12
\$0.60	\$0.70	\$0.90



PLAIN WING CALIPERS.



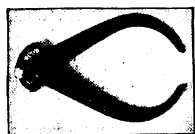
D 1766. Outside Caliper.

Size, inches.....	2½	3
D 1766. Price, each.....	\$0.60	\$0.65
D 1767. Price, each.....	.55	.75

D 1767. Inside Caliper.

4	6	8
\$0.60	\$0.75	\$1.05
.55	.75	.....

For Useful
Tables, see
Back of
Book.



OUTSIDE AND INSIDE CALIPERS.



D 1768. Outside Caliper.

Size, inches.....	2½	3	4	5	6
D 1768. Price, each.....	\$0.50	\$0.55	\$0.60	\$0.65	.....
D 1769. Price, each.....	.....	.....	.....	.60	\$0.70

D 1769. Inside Caliper, with Set Screw.

4	5	6
\$0.60	\$0.65	.....
.....	.60	\$0.70





REGISTER CALIPERS.



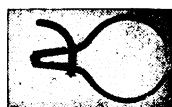
D 1780. Outside Caliper.

D 1781. Inside Caliper.

Size, inches..... 6 8
D 1780 or D 1781. Price, each.....\$1.20 \$1.50



REGISTER AND WING CALIPERS.



D 1782. Outside and Inside Register Caliper, nickel plated.

D 1783. Wing Calipers.

Size, Inches..... 3 4 5 6 7 8 9 10 12 15 20 24
D 1782. Price, each..\$0.75 .90 1.05 1.20
D 1783. Price, each..\$0.60 .65 .70 .75 1.00 1.10 1.30 1.75 2.00 3.00



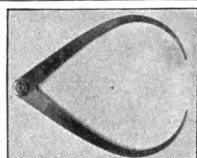
STAR CALIPERS.



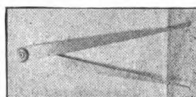
D 1784. Outside Caliper.

D 1785. Inside Caliper.

Size, inches..... 3 5
D 1784 or D 1785. Price, each.....\$0.85 1.00



THE WELLES FIRM JOINT CALIPERS.



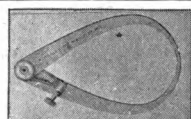
D 1786. Outside Caliper.

D 1787. Inside Caliper.

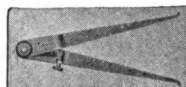
Size, inches..... 5 8 12 18 24
D 1786 or D 1787.....each, \$0.60 .80 1.00 1.75 2.00

N. B.—The Outside Calipers are rated by the circle or diameter of shaft they will caliper. The Inside are rated by the length of the legs.

Special
Drills,
Made to
Order.



THE WELLES PATENT ADJUST- ABLE CALIPERS.



D 1788. Outside Caliper.

D 1789. Inside Caliper.

Size, inches..... 5 8 12 18 24
D 1788 or D 1789. Price, each..... \$1.00 1.40 1.70 2.25 3.00

N. B.—The Outside Calipers are rated by the circle or diameter of shaft they will caliper. The Inside are rated by the length of the legs.



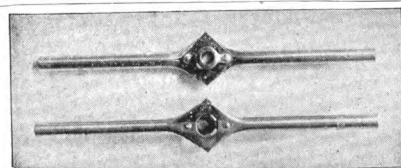
THE WELLES HERMAPHRODITE CALIPERS.



D 1790. Firm Joint Caliper.

D 1791. Patent Adjustable Caliper.

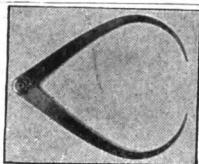
Size, inches..... 5 8 12
D 1790. Price, each.....\$0.60 \$0.80 \$1.00
D 1791. Price, each..... 1.00 1.40



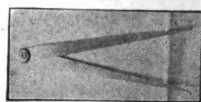
D 1792.

BADGER DIE STOCKS FOR BICYCLE USE.

For price, see page 51.



STEVENS' FIRM JOINT CALIPERS.



**D 1802. Outside Caliper,
No. 56A.**

Size, inches..... 3
Price, each.....\$0.50

**D 1803. Inside Caliper,
No. 56C.**

4 5 6
\$0.55 \$0.60 \$0.70



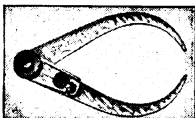
STEVENS' WING FIRM JOINT CALIPERS.



**D 1804. Outside Caliper,
No. 56B.**

Size, inches..... 8 10 12 14 16 18 20
D 1804 or D 1805. Price, each.....\$1.00 \$1.10 \$1.25 \$1.50 \$1.75 \$2.10 \$2.50

**D 1805. Inside Caliper,
No. 56D.**



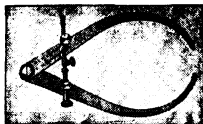
STEVENS' LOCK JOINT AND TRANSFER CALIPERS.



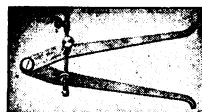
**D 1806. Outside Caliper,
No. 55A.**

Size, inches..... 3 4 5 6
D 1806 or D 1807. Price, each.....\$1.00 \$1.15 \$1.25 \$1.50

**D 1807. Inside Caliper,
No. 55B.**



STEVENS' FINE ADJUSTING AND TRANSFER CALIPERS.

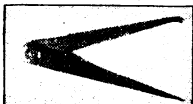


Special
Taps
Made to
Order.

**D 1808. Outside Caliper,
No. 100.**

Size, each..... 6 8 10 12
D 1808 or D 1809. Price, each.....\$1.50 \$1.75 \$2.00 \$2.25

**D 1809. Inside Caliper,
No. 105.**



STEVENS' CALIPERS.



**D 1810. Firm Joint Hermaph-
rodite Caliper, No. 56E.**

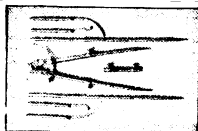
Size, inches..... 3 4 5 6
D 1810. Price, each.....\$0.50 \$0.55 \$0.60 \$0.70
D 1811. Price, each..... 1.00 1.15 1.25 1.50

**D 1811. Lock Joint Her-
maphrodite Caliper, No. 55C.**

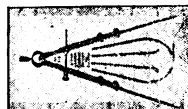


STEVENS' EXTENSION DIVIDER, D 1812. COMPLETE, No. 61.

7-incheach, \$2.25
9 " " 2.50

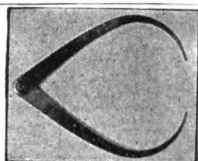


**D 1813. Ideal Combined
Inside and Outside
Divider and Caliper, No. 62.**

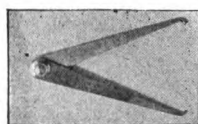


**D 1814. Leader Combined
Divider and Caliper.**

D 1813. Complete, Nickel Plated, each, \$4.00 | D 1814. Complete. each, \$2.50



**STARRETT'S
IMPROVED
FIRM JOINT
CALIPERS.**



**D 1825. Outside Caliper
No. 26.**

**D 1826. Inside Caliper,
No. 27.**

Size, inches..... 3 4 5 6 8 10 12 14 16 18 20 24
D 1825 or D 1826. Price, each, \$0.40 .50 .55 .65 .80 .90 1.00 1.50 1.75 2.10 2.50 3.00



**STARRETT'S
LOCK JOINT
CALIPERS.**



**D 1827. Outside Caliper,
No. 38.**

**D 1828. Inside Caliper,
No. 39.**

Size, inches..... 4 6 8 10 12 14 16 18 20 24
D 1827 or D 1828. Price, each, \$0.90 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.50



**STARRETT'S
LOCK JOINT
TRANSFER
CALIPERS.**



**D 1829. Outside Caliper,
No. 36.**

**D 1830. Inside Caliper,
No. 37.**

Size, inches..... 4 5 6 8 10 12 14 16 18 20 24
D 1829 or D 1830. Price, each, \$1.25 1.40 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.50 4.25



**D 1831. New Firm Joint
Hermaphrodite Caliper,
No. 41.**



**D 1832 Adjustable Her-
maphrodite Caliper,
No. 42.**

Size, inches..... 3 4 5 6 8 10 12
D 1831. Price, each.... \$0.40 \$0.50 \$0.55 \$0.65 \$0.80 \$0.90 \$1.00
D 1832. Price, each.... .90 1.00 1.25 1.50



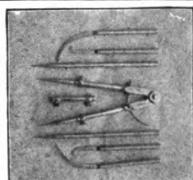
**COMBINED CAL-
IPERS AND
DIVIDERS.**



**D 1833. Extension Divider,
with Divider Legs only.**

**D 1834. Extension
Divider, Complete, No. 85.**

D 1833, 7 in., \$1.25; 9 in., \$1.50, each | D 1834, 7 in., \$2.25; 9 in., \$2.50, each



**D 1835. STARRETT'S
IMPROVED COMBINATION CALIPER
AND DIVIDER, No. 90.
Nickel Plated.**

With Short Points, only \$2.25
Set, complete..... 4.00
Sent complete, unless otherwise ordered. **Helmet Oil
Lubricates
Anything.**

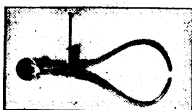
EXTRA PARTS.

Long Points..... \$0.50 | Outside or Inside Caliper Legs \$0.50
Auxiliary Pencil Holder .40 | Ex. Long Points (scribe 44-in. circle) to order .60

D 1836. HELMET BRONZE LETTER OPENER.



Actual length of opener, eight inches. This Letter Opener shows the elasticity of *Helmet Spring Bronze*. Letter Opener mailed on receipt of 16 cts. in stamps.



THE FAY PATENT OUTSIDE AND IN- SIDE CALIPERS WITH SPRING NUT.



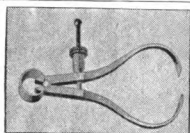
**D 1846. Outside Caliper,
No. 75.**

**D 1847. Inside Trans-
fer Caliper,
No. 74.**

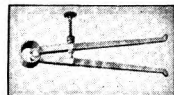
Size, inches.....	2½	3	4	5	6
D 1846 or D 1847. Solid Nut, each.....	\$1.00	1.00	1.10	1.10	1.35
D 1846 or D 1847. Spring Nut, each.....	1.15	1.15	1.25	1.25	1.50

These Calipers will be sent with spring nut unless otherwise ordered. Inside Caliper not made in 2½ inch. D 1847 represents a new Inside Transfer Caliper, with either solid or spring nut. The bow is stiff, making the caliper reliable. After calipering inside a chambered cavity, by pressing the legs together, they may be withdrawn, and as they spring back will show the exact size calipered.

**Bonanza
Oil Cups
are Good.**



THE FAY PATENT THREAD AND IN- SIDE CALIPERS.



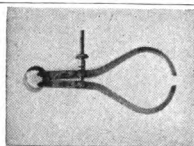
**D 1848. Outside Caliper with
Spring Nut, No. 76.**

**D 1849. Inside Caliper with
Solid Nut, No. 78.**

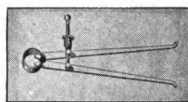
Size, inches.....	3	4	5
D 1848 or D 1849. Solid Nut, each.....	\$1.00	\$1.10	\$1.10
D 1848. Spring Nut, each.....	1.15	1.25	1.25

D 1849 Inside Calipers are not made to receive the spring nut. D 1849 Inside Calipers not made in 3 inch. Duplicate parts for either size and style of Fay Caliper or Divider will be forwarded to any address, postpaid, on receipt of following prices:

Screw and Ball.....	\$0.15	Spring Nut.....	\$0.25	Jam Washer.....	\$0.10
Thumb Attachment. .15		Leg.....	.35	Fulcrum Stud....	.10
Solid Nut.....	.10	Spring.....	.25		



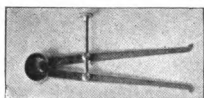
YANKEE OUTSIDE AND INSIDE CALIPERS.



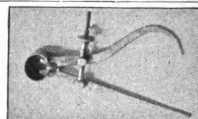
**D 1850. Outside Caliper,
Solid Nut, No. 79.**

**D 1851. Inside Transfer Caliper,
Spring Nut, No. 73.**

Size, inches.....	2½	3	4	5	6	8
D 1850 or D 1851. With Solid Nut, each....	\$0.65	\$0.70	\$0.75	\$0.80	\$0.85	\$1.00
D 1850 or D 1851. With Spring Nut, each. .90	.95	1.00	1.05	1.10	1.25	



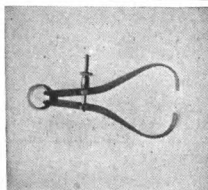
YANKEE INSIDE AND KEYHOLE CALIPERS.



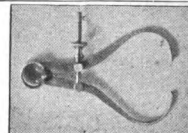
**D 1852. Inside Caliper,
No. 81.**

**D 1853. Keyhole Caliper,
No. 82.**

Size, inches.....	3	4	5	6
D 1852. With Solid Nut. Price, each.....	\$0.75	\$0.80	\$0.85	
D 1853. With Solid Nut. Price, each.....	\$0.70	.75	....	....



YANKEE THREAD CALIPERS.



**D 1855. Outside Caliper
with Solid Nut. No. 80.**

Size, inches.....	3	4	5
D 1854. Outside Caliper with Spring Nut. No. 80. Price, each, \$0.75	.90	1.00	
D 1854, with Spring Nut, " " " " " "	1.00	1.15	1.25

Duplicate parts for any size of Yankee Caliper will be forwarded to any address, postpaid, on receipt of the following prices:

Screw and Ball.....	\$0.15	Spring Nut.....	\$0.25	Jam Washer.....	\$0.10
Thumb Att'chment .15		Leg.....	.25	Fulcrum Stud....	.10
Solid Nut.....	.10	Spring.....	.25	Stud.....	.10

STEVENS' PATENT IDEAL AND LEADER SPRING CALIPERS.

Detachable Bow. All parts interchangeable. Made of special grade of forged steel, finely finished, and carefully tempered.



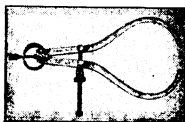
**STEVENS' IDEAL
OUTSIDE AND
INSIDE SPRING
CALIPERS.**



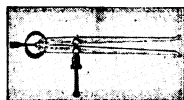
**D 1866. Outside Caliper,
No. 63.**

**D 1867. Inside Caliper,
No. 65.**

Size, inches.....	2½	3	4	5	6
D 1866. Price, each.....	\$1.00	\$1.00	\$1.25	\$1.25	\$1.50
D 1867. Price, each.....		1.00	1.25	1.25	1.50



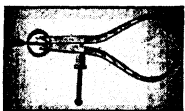
**STEVENS' LEADER
OUTSIDE AND
INSIDE SPRING
CALIPERS.**



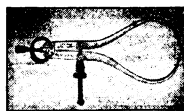
**D 1868. Outside Caliper,
No. 70.**

**D 1869. Inside Caliper,
No. 72.**

Size, inches.....	2½	3	4	5	6	8
D 1868. Price, each.....	\$0.65	\$0.70	\$0.75	\$0.80	\$0.85	\$1.00
D 1869. Price, each.....		.70	.75	.80	.85	....



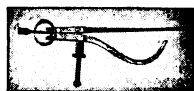
**STEVENS' IDEAL
AND LEADER OUT-
SIDE SPRING
SCREW THREAD
CALIPERS.**



**D 1870. Outside Caliper,
No. 64.**

**D 1871. Outside Caliper,
No. 71.**

Size, inches.....	3	4	5
D 1870. Price, each.....	\$1.00	\$1.25	\$1.25
D 1871. Price, each.....	.75	.90	1.00



**STEVENS'
CALIPERS.**



Milling
Cutters
Made for
Bicycle
Work.

**D 1872. Ideal Spring
Keyhole Caliper,
No. 68.**

**D 1873. Leader Spring
Keyhole Caliper,
No. 73.**

Size, inches.....	3	4	5
D 1872. Price, each.....	\$1.00	\$1.25	\$1.25
D 1873. Price, each.....	.70	.75	....

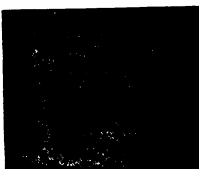
D 1874. STEVENS' SCRIBER, No. 80.

Mechanics becoming disgusted with the Imported Scrubbers, on account of softness and difficulty in holding, persuaded this company to see what we could produce in place of them.

We know we have succeeded in bringing out a tool which is an ornament to every Mechanic's Kit both in point of beauty and usefulness. It is made

in three pieces, the center piece being heavily knurled, into which is screwed the two points, which are made of fine steel nicely tempered. These parts are all interchangeable. This tool is also far superior to the home-made twisted scriber, which is always liable to turn in the hand at the very moment it should not.

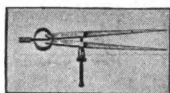
7 inch. Price, each.....\$0.40



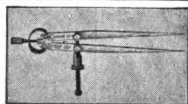
D 1875. STEVENS' UNIVERSAL BEVEL, No. 125.

This tool is far superior to the old style gauge, in that the blade is offset to allow it to stand parallel or at any angle with the body of tool.

1½ inch.....\$1.25 | 3 inch.....\$1.50



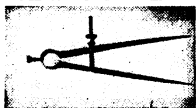
STEVENS' DIVIDERS.



D 1886. Stevens' Ideal Divider, Spring Nut, with Thumb Attachment, No. 67.

D 1887. Stevens' Leader Divider with Thumb Attachment, No. 75.

Size, inches.....	2½	3	4	5	6	8
D 1886. Price, each.....	\$1.00	\$1.00	\$1.25	\$1.25	\$1.50	.....
D 1887. " " .....	.65	.70	.75	.80	.85	1.10



STEVENS' SPRING DIVIDERS.

With Patent Washer and Thumb Attachment, No. 53.

Size, inches.....	2	3½	4	5	6
D 1888. With Thumb Attachment, ea..	\$1.15	\$1.15	\$1.40	\$1.50	\$1.75
D 1889. Without " "	1.00	1.00	1.25	1.25	1.50



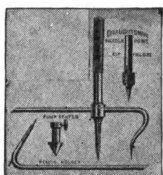
D 1890.



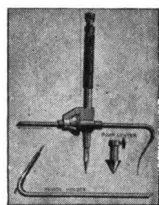
D 1891. Pencil Holder.

D 1890. 3-inch. Price each.....	\$1.75
D 1891. For marking circles; to be attached to dividers or compasses, ea.	.30

STEVENS' PARALLEL DIVIDERS.



D 1892. Price, complete....	\$2.50
D 1893. " "	3.75
Needle Point.....each,	.50
Pump Center.....	.25
Pencil Holder .....	.50

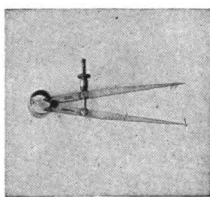


D 1892. Stevens' Parallel Divider, No. 111.

D 1893. Stevens' Parallel Divider with Micrometer Adjustment, No. 110.

YANKEE SPRING DIVIDERS.

These Dividers are furnished with spring nut, when ordered, at an extra cost of 25 cents each.



D 1894. Yankee Spring Divider, No. 84.

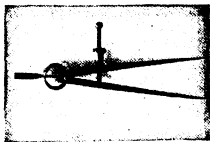


Badger Die Stock Always Cuts Same Size.

D 1895. Yankee Spring Divider with Thumb Attachment, No. 83.

Size, inches.....	2½	3	4	5	6	8
D 1894. Price, each.....	\$0.65	\$0.70	\$0.75	\$0.80	\$0.85	\$1.10
D 1895. " " .....	.80	.85	.90	.95	1.00	1.25

THE FAY PATENT SPRING DIVIDERS.

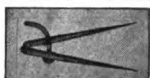


D 1896. Fay Spring Divider, No. 77.



Spring Nut.

Size, inches.....	2½	3	4	5	6
D 1896. With Spring Nut. Price, each.....	\$1.15	\$1.15	\$1.40	\$1.40	\$1.75
D 1897. With Solid Nut. " "	1.00	1.00	1.25	1.25	1.50



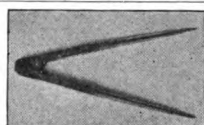
D 1908.

WING DIVIDER.

Size, inches.....	5	6	7	8	9	10	12	15	18	24
Price, each.....	\$0.55	.55	.65	.75	.90	1.00	1.20	1.80	2.50	3.60



EUCLID
DIVIDER
AND
COMPASS.



D 1909. Euclid Divider.

D 1910. Euclid Compass.

Size, inches.....	4	6	8	10	12	15	18	24	36
D 1909. Price, each.....	\$0.45	.60	.75	.90	1.05	1.35	1.80	3.50	7.00
D 1910. Price, each.....	.40	.50	.60	.70	.90	....	....	....	....



D 1911.

WING COMPASS.

Size, inches.....	4	6
Price, each.....	\$0.55	\$0.70

Special
Taps.
Reamers,
Milling
Cutters,
Made to
Order.



LOCK JOINT
DIVIDERS.



D 1912. Starrett's, No. 43.

D 1913. Stevens'.

Size, inches.....	6	8	10
D 1912 or D 1913. Price, each.....	\$1.00	\$1.25	\$1.50



D 1914. Firm Joint.

WELLES
DIVIDERS.



D 1915. Patent Adjustable.

Size, inches.....	5	8
D 1914. Price, each.....	\$0.60	\$0.80
D 1915. Price, each.....	1.00	1.40



D 1916. STEVENS' DEPTH GAUGE, No. 85.

In manufacturing this Depth Gauge we have attempted to meet the demand for such a tool as could be sold at a moderate price, and at the same time it is a very excellent article and will answer all purposes for which costly tools are used. The back is made from sheet steel, nicely polished; the edge is ground straight, so that by removing the needle it may be used as a straight-edge.

An excellent feature of this tool consists in having one edge of back beveled, and one side of the needle being ground away making the point directly under edge of back so that the tool may be rocked, thus determining the depth of a hole or slot more accurately than can be done with a tool having a broad base. Price, each.....\$0.50

D 1917. STEVENS' ADJUSTABLE SCRATCH GAUGE, No. 130.

With Fine Adjustment.



We think we can safely say that this is the handiest, neatest and best scratch gauge made.

The eccentric head will be appreciated by every mechanic who has ever tried to use the ordinary gauge where a shoulder on the work was in the way. The fine adjustment is an invaluable feature, saving the trouble of knocking the head back and forth when the tool is to be altered just a little. We also make this tool with a micrometer adjustment so that it can be readily adjusted by thousandths of an inch.

Plain adjustment, 6 inch.....\$1.75 | Micrometer adjustment, 6 inch..\$2.00

D 1918.

STEVENS' CENTER SQUARE, No. 137.



This also is an all steel tool. The stock is milled from bar steel and the blade is nicely graduated and tempered. It is much lighter than the common center square and the blade can be used as a rule when so desired, it having no slot to spoil its appearance. This tool is warranted accurate.

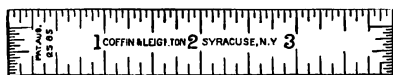
Price, each.....\$2.25

COFFIN & LEIGHTON'S TOOLS.

IMPROVED MACHINISTS' SCALES.

Badger
Die
Stocks
for
Bicycle
Use.

D 1929. END GRADUATED RULES.



The cut represents their patent end graduation. They have since 1885 made end graduated rules, and they ask for no better recommendation for their utility than a glance at the imitations now manufactured.

Although at an extra cost, they furnish this on *all* (except their narrow and flexible rules) 12-inch and shorter lengths without extra charge, and any one ordering a rule of their make will have the benefit of this valuable improvement. Price per inch on all weights the same.

D 1930. HEAVY TEMPERED END GRADUATED RULES.

They manufacture the only line of heavy tempered rules on the market.

Length.	Approx. Width.	Thick- ness.	Price.	Length.	Approx. Width.	Thick- ness.	Price.
4-inch...	3-4 inch...	1-20-inch...	\$ 0.45	18-inch...	1 1/4-inch...	1-12-inch...	\$2.00
6-inch...	1- inch	1-16-inch...	.65	24-inch...	1-2-inch...	1-10-inch...	2.50
12-inch...	1 1/4 inch...	1-12-inch...	1.25	36-inch...	1-2-inch...	1-10-inch...	5.00

D 1931. LIGHT TEMPERED RULES.—End Graduated.

Length.	Approx. Width.	Thick- ness.	Price.	Length.	Approx. Width.	Thick- ness.	Price.
2-inch...	1-2-inch...	1-20-inch...	\$0.25	12-inch...	1- inch	1-16-inch...	\$1.25
3-inch...	5-8-inch...	1-20-inch...	.35	18-inch...	1- inch	1-16-inch...	2.00
4-inch...	5-8-inch...	1-20-inch...	.45	24-inch...	1- inch	1-16-inch...	2.50
6-inch...	3-4-inch...	1-20-inch...	.65	36-inch...	1- inch	1-16-inch...	5.00
9-inch...	1- inch	1-16-inch...	1.00				

D 1932. SEMI-FLEXIBLE RULES.—End Graduated.

These rules are 1-50-inch thick (as thin as practical to graduate on both sides. They were the first to manufacture this class of rules, and the demand for them demonstrates their popularity. Graduated 8th, 16th, 32d, 64th.

Length.	Approx. Width.	Thick- ness.	Price.	Length.	Approx. Width.	Thick- ness.	Price.
2-inch...	1-2 inch...	1-50-inch...	\$0.25	12-inch...	1 1/2-inch...	1-50-inch...	\$1.25
3-inch...	5-8 inch...	1-50-inch...	.35	18-inch...	3-4 inch...	1-50-inch...	2.00
4-inch...	5-8 inch...	1-50-inch...	.45	24-inch...	3-4 inch...	1-50-inch...	2.50
6-inch...	11-16-inch...	1-50-inch...	.65	36-inch...	3-4 inch...	1-50-inch...	5.00
9-inch...	11-16-inch...	1-50-inch...	1.00				

D 1933. FLEXIBLE RULES.—Not End Graduated.

Length.	Approx. Width.	Thickness.	Price.
4-inch.....	5-8-inch.....	1-100-inch.....	\$0.45
6-inch.....	5-8-inch.....	1-100-inch.....	.65
12-inch.....	5-8-inch.....	1-100-inch.....	1.25

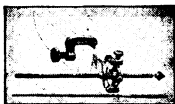
Graduated one side 64th and 32d.

D 1934. NARROW TEMPERED RULES.—Not End Graduated.

Length.	Approx. Width.	Thickness.	Price.
4-inch.....	7-32-inch.....	1-20-inch.....	\$0.45
6-inch.....	7-39-inch.....	1-20-inch.....	.65

Graduated both sides, 64th and 32d.

D 1935. STEVENS' CENTER INDICATOR, No. 140.

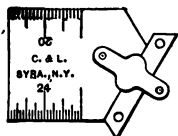


This tool, as its name implies, is used for truing up work in a lathe. It can be used equally as well for truing a prick punched center, a hole or a mandrel. It is provided with a little "C" clamp, by which the indicator is attached to the shank of any lathe tool, doing away with the necessity of carrying so much extra stock. The steel back is tempered, furnishing a flexible spring for the pointer. The ball joint is both universal and oscillating; universal when the top nut is unscrewed, and oscillating when tightened.

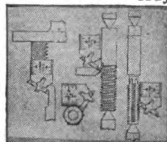
The pointer can be clamped at any desired position by the knurled nut on the ball. It is also furnished with a lance wood tip which throws the center of gravity well forward, freeing it from the objectionable vibration that so often occurs. Its bearings are all taper cone bearings and all lost motion can be easily taken up. This tool is warranted in every particular. Price, each, \$2.50

COFFIN & LEIGHTON'S TOOLS.

Gardner
Die Stock is
Adjustable.



ADJUSTABLE NOTCH CENTER GAUGES.



D 1946.

These Center Gauges are made of spring-tempered crucible steel, and all angles are accurately ground. The notch being made of separate pieces, insures a perfect angle to the extreme point. By pushing the link either way the sliding blade is held firmly in any position desired. It is the *only* Center Gauge that will fit *any size* inside threading tool.

The sliding blade, together with the size of the tool, makes it very useful in many other ways. | Price.....\$0.50



D 1947.

IMPROVED CENTER GAUGE, TEMPERED.

Three Notches.

Thickness, 1-30 inch. | Price, each.....\$0.30



D 1948.

NEW DRAUGHTSMAN'S PROTRACTOR.

This Protractor has spring-tempered blades about 9 inches long. The arc is 4 inches in diameter, graduated to degrees, with a vernier reading to five minutes. It has a binding screw that securely holds the blades at any angle and enables it to be picked up and moved about readily.

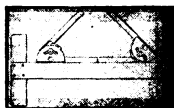
Either blade can be used in contact with a T square, giving any angle and its complement from 0 degree to 90 degrees.

It forms a perfect adjustable triangle. It is nicely nicked and finished, and is a convenient and reliable tool at a price that will bring it within the reach of all.

Price.....\$4.00 | In Mahogany Case.....\$5.00



Showing Positions on
Draughting Board.



TAPERS PER FOOT AND CORRESPONDING ANGLES.

Taper Per Foot	Included Angle.	Angle with Center Line.	Taper Per Foot	Included Angle.	Angle with Center Line.	Taper Per Foot	Included Angle.	Angle with Center Line.
1-8"	0°-36'	0°-18'	3-4"	3°-35'	1°-47'	2"	9°-32'	4°-46'
1-4"	1°-12'	0°-36'	15-16"	4°-28'	2°-14'	2½"	11°-54'	5°-57'
5-16"	1°-30'	0°-45'	1"	4°-45'	2°-23'	3"	14°-16'	7°-08'
3-8"	1°-47'	0°-53'	1½"	7°-08'	3°-34'	3½"	16°-36'	8°-18'
7-16"	2°-05'	1°-02'	1¾"	8°-20'	4°-10'	4"	18°-54'	9°-27'
1-2"	2°-23'	1°-11'						



D 1949. MACHINISTS' PROTRACTOR.

This Protractor has both blades in the same plane and is flat on one side.

Both blades will come in contact with work or drawing. As one blade is exactly over the other, thin templets can be fitted readily, avoiding the objection of offset blades, as in the ordinary tool, while the side of the graduated semi-circle furnishes an offset blade when desired.

One edge of each blade is radial and extends to the extreme point of any angle from 0 degrees to 180 degrees. The blades are about 7 inches long; the arc 4 inches in diameter, graduated to degrees, and figured from 0 degrees to 180 degrees (double row). The zero line is in same plane with the graduation.

Price.....\$5.50 | In Mahogany case.. \$6.50

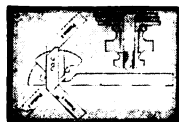
Cut of Protractor in detail shows:

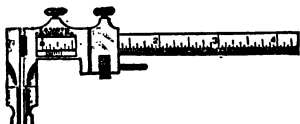
Position 1..... 0 degrees to 90 degrees.

" 2..... 90 " 180 "

" 3..... When used on draughting table.

Detail of device for clamping blade and rotating head.





D 1974. "COLUMBIA" VERNIER CALIPER, No. 9.

Graduated into 50ths with Vernier to read 1,000ths of an inch, the other side into 16ths with Vernier to read 64ths and 128ths of an inch.

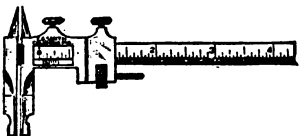
The Jaws and end of Scale are hardened. Heretofore we have only furnished these instruments to order, but as they are all giving good satisfaction, and having frequent calls for them, we have decided to carry them in stock and can now fill orders promptly.

4-Inch, with jaws $1\frac{1}{4}$ inches long and 5-32 thick	\$ 6.00
6 " " " $1\frac{1}{2}$ " " " 3-16 "	7.00
8 " " " $2\frac{1}{8}$ " " " 7-32 "	8.00
10 " " " $2\frac{3}{8}$ " " " $\frac{1}{4}$ "	9.00
12 " " " $3\frac{1}{8}$ " " " $\frac{3}{8}$ "	10.00
14 " " " $3\frac{3}{8}$ " " " $\frac{3}{8}$ " (to order)	11.00
18 " " " $3\frac{1}{2}$ " " " $\frac{3}{8}$ "	14.00
24 " " " $3\frac{7}{8}$ " " " $\frac{3}{8}$ "	16.00

COMPARISON INVITED.

Metric System to order.

Special small sizes can also be made to order. We have often calls for a $2\frac{1}{2}$ -inch Caliper with 1-inch jaw, price of which is \$5.50.



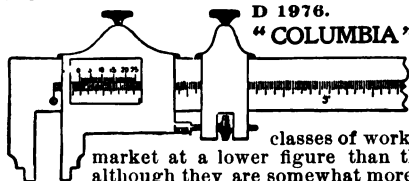
D 1975. "COLUMBIA" VERNIER CALIPER, No. 10.

With hardened steel points, otherwise same as No. 9. For laying out work, etc., it has no equal. The points can be ground without losing their accuracy.

4-Inch, with jaws $1\frac{1}{4}$ inches long and 5-32 thick	\$ 7.00
6 " " " $1\frac{1}{2}$ " " " 3-16 "	8.00
8 " " " $2\frac{1}{8}$ " " " 7-32 "	9.00
10 " " " $2\frac{3}{8}$ " " " $\frac{1}{4}$ "	10.50
12 " " " $3\frac{1}{8}$ " " " $\frac{3}{8}$ "	12.00
14 " " " $3\frac{3}{8}$ " " " $\frac{3}{8}$ " (to order)	13.00
18 " " " $3\frac{1}{2}$ " " " $\frac{3}{8}$ "	16.00
24 " " " $3\frac{7}{8}$ " " " $\frac{3}{8}$ "	18.00

Points as above can be put on any style Caliper at the following rates: \$1.50 on the 4, 6 and 8-inch sizes, and \$2.00 on the larger ones.

HOW TO READ THE VERNIER.—The Vernier on the No. 5 Caliper consists of a number of equally divided spaces on the sliding head, in this case 7-16 of the space being divided into eight parts; consequently on each one of the spaces is a difference of a 128th of an inch, on every two, a 64th, every four, a 32d, etc. The scale itself is divided into 16ths, and the first or index line of the Vernier is used to read the 16ths, and when it shows beyond a graduation on the scale and the line next to it corresponds with any line on the scale you add 1-128 to the size indicated by the index line; or if the line after the second space corresponds add 2-128 or 1-64, if the line after the seventh space corresponds as shown in cut, add 7-128, etc. The same principle is used on the Nos. 9 and 10 Calipers, the scale being divided into 50ths, and the Vernier divides them into 1,000ths.



D 1976. "COLUMBIA" VERNIER CALIPER, No. 21.
(B. and S. Style.)

Same graduation as Nos. 9 and 10. As this class and shape Caliper is preferable for certain

classes of work, we concluded to put them on the market at a lower figure than they have heretofore been offered, although they are somewhat more expensive to get up than the regular "Columbia" Caliper.

PRICES IN WALNUT CASE.

6-inch, with jaws $1\frac{1}{4}$ inches long	\$12.00	Gardner
8 " " " $1\frac{1}{2}$ " " " (to order)	15.00	Die Head
12 " " " $1\frac{3}{4}$ " " " " "	18.00	Cuts
18 " " " 2 " " " " "	21.00	Accurate
24 " " " $2\frac{1}{4}$ " " " " "	25.00	Threads.

Special sizes and Metric System to order. Warranted superior to any make.

D 1977.

THE HOWELL C. I. B. TRY SQUARE.



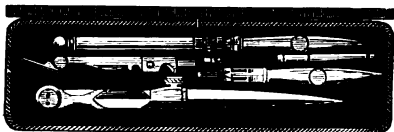
Size, inches.... 2 3 4 6 8 10 12
Price, each.... \$0.75 1.00 1.25 1.50 2.00 2.50 3.00

The length of blade as given is from the inner edge of beam to end of blade. These squares are warranted practically correct and are equal in every way to any on the market.

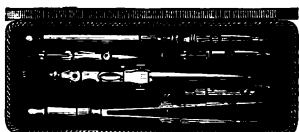
GERMAN SILVER DRAWING INSTRUMENTS.

Made in First and Second Quality.

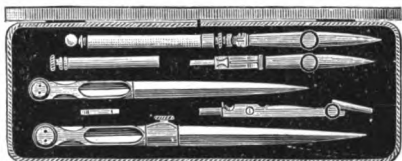
These are Perfect Tools, put up in handsome Velvet Lined Leather Cases.



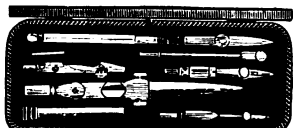
D 2005. Price, per Set.....\$3.00



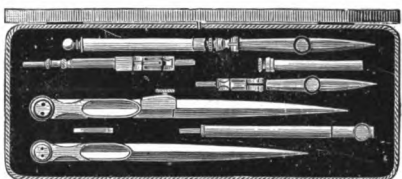
D 2006. Price, per Set..... \$6.00



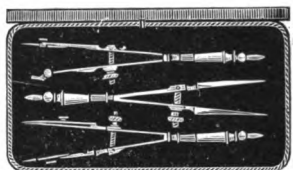
D 2007. Price, per Set.....\$3.50



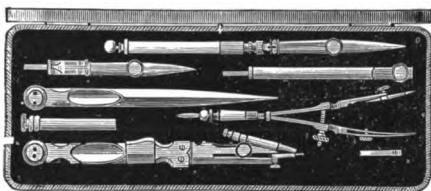
D 2008. Price, per Set...\$4.50



D 2009. Price, per Set.....\$4.50

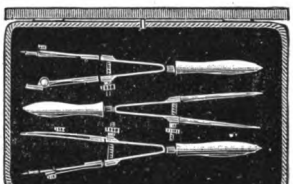


D 2100. Price, per Set.....\$4.00



D 2011.

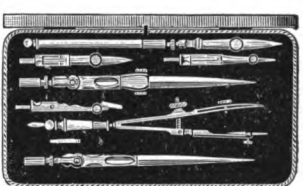
Price, per Set, First Quality.....\$7.00
Second Quality..... 6.00



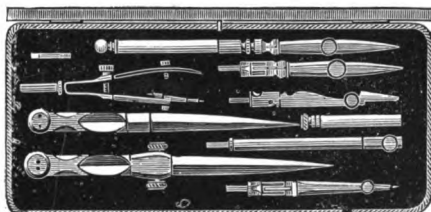
D 2012. Price, per Set.....\$5.50



D 2013. Price, per Set..... \$7.50



D 2014. Price, per Set.....\$7.00



D 2015.

Price, per Set.

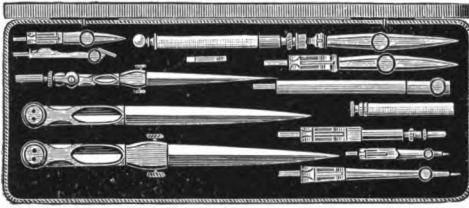
First Quality.....\$8.00

Second Quality..... 7.00

Gardner
Grinder
for Flat
Grinding.

GERMAN SILVER DRAWING INSTRUMENTS.**Made in First and Second Quality.**

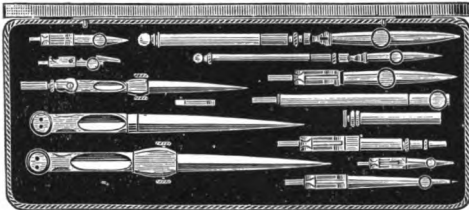
These are Perfect Tools, put up in handsome Velvet Lined Leather Cases.

**D 2026.**

Price, per Set.

First Quality.....\$10.00

Second Quality..... 9.00

**D 2027.**

Price, per Set.

First Quality.....\$11.00

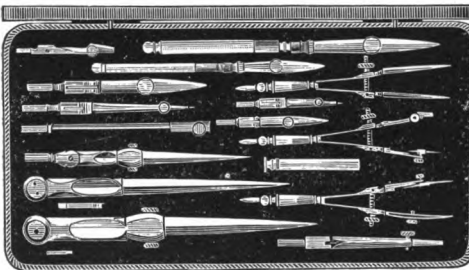
Second Quality..... 10.00

**D 2028.****Bonanza
Oil Cups
are Good.**

Price, per Set.

First Quality.....\$12.00

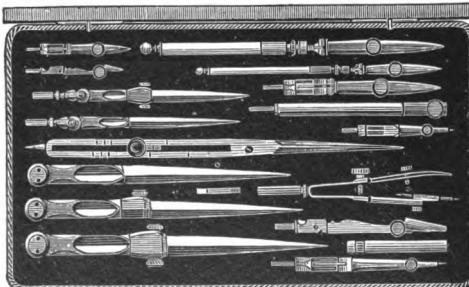
Second Quality11.00

**D 2029.**

Price, per Set.

First Quality.....\$15.00

Second Quality 12.50

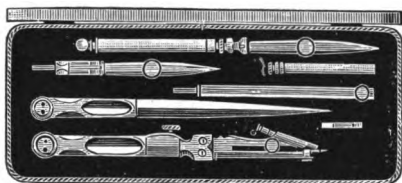
**D 2030.**

Price, per Set.....\$18.00

GERMAN SILVER DRAWING INSTRUMENTS.

Made in First and Second Quality.

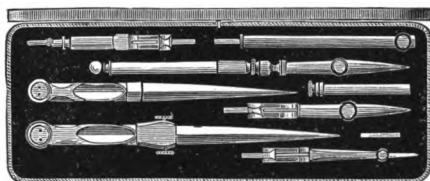
These are Perfect Tools, put up in handsome Velvet Lined Leather Cases.



D 2041.

Price, per Set.

First Quality.....\$5.00

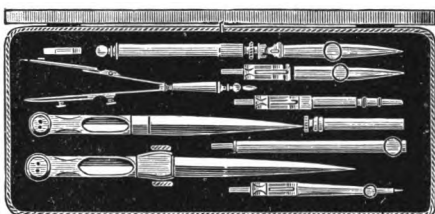


D 2042.

Price, per Set.

First Quality.....\$6.50

Second Quality..... 5.00



D 2043.

Price, per Set.

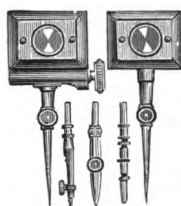
First Quality.....\$12.00

Second Quality..... 10.00



D 2044.

Price, per Set.....\$16.00



D 2045.

Beam Compass.....\$8.00

Dies,
Special
Shapes
and
Threads,
Made to
Order.

D 2046.

DETAIL PAPERS.

Width.....	36 in.	42 in.	54 in.	
American.....per yard,	\$0.10	\$0.12½	\$0.20	} In full rolls of 50 yards. \$0.20 per lb.
Common Sense, thin.....“ “	.10	.12½	.20	
“ “ heavy.....“ “	.12½	.15	.25	
Acme.....“ “	.35	.40	.50	
“.....per roll of 10 yards,	4.00	4.50	5.00	

D 2047.

TRACING PAPER.

	Sheets.	Per Quire.
French Vegetable Demy.....15x20 inches.		\$1.80
“ “.....20x30 “		1.20
“ “ Imperial.....21x27 “		3.50

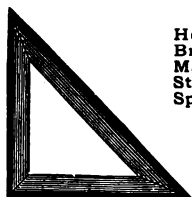
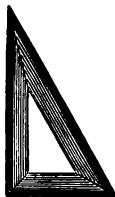
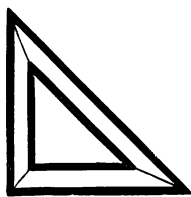
D 2048.

TRACING CLOTH.

Width.....	36 in.	42 in.
Imperial Tracing Cloth.....per yard,	\$ 0.50	\$ 0.75
“ “.....per roll of 24 yards,	10.75	15.00

D 2059.

TRIANGLES.



Helmet Bronze Makes Stiff Springs.

Pearwood, 30°×60°×90°, Inches.....	5	6½	8	9½
Price, each.....	\$0.10	\$0.10	\$0.15	\$0.15
" 45°×45°×90°, Inches.....	4	5	6	8
Price, each.....	\$0.15	\$0.15	\$0.15	\$0.20
Pearwood Frame, open center, 30°×60°×90°, Inches.....		7	9	12
Price, each.....		\$0.25	\$0.25	\$0.30
" " " " 45°×45°×90°, Inches.....		6½	8	10
Price, each.....		\$0.25	\$0.30	\$0.40
Mahogany, Ebony Lined, 30°×60°×90°, Inches.....		7	9	11
Price, each.....		\$0.60	\$0.80	\$0.90
" " " 45°×45°×90°, Inches.....		6	7½	9
Price, each.....		\$0.70	\$0.85	\$1.00
Hard Rubber, 30°×60°×90°, Inches.....	6	8	10	12
Price, each.....	\$0.40	\$0.60	\$0.70	\$1.00
" " 45°×45°×90°, Inches.....	5	7	9	11
Price, each.....	\$0.50	\$0.65	\$0.80	\$1.10



D 2060.

T SQUARES.

	Pearwood, Fixed Head, In.	20	24	36	42
	Price, each.....	\$0.45	\$0.50	\$0.65	\$0.85
Maple blade, black walnut,	Fixed Head, price, each..		.85	1.25	1.50
“ “ “	Shifting Head, price, each		1.60	2.25	2.50
Mahogany, Ebony Lined,	Fixed Head, Inches long...	30	36	42	48
	Price, each.....	\$2.25	\$2.50	\$2.75	\$3.25
“ “ “	Shifting Head, price, each.	3.00	3.50	4.00	4.75



INDIA INK. D 2061. LYON HEAD.

Length, Inches.....	21 $\frac{1}{4}$	3	4
Price, per stick.....	\$0.15	\$0.20	\$0.25



D 2062. ELEPHANT BRAND.

Size, $3\frac{3}{4} \times 3\frac{3}{8} \times 3\frac{3}{8}$, price, per stick.....	\$1.00
" $3\frac{3}{4} \times 3\frac{3}{4} \times 3\frac{3}{8}$, " "	2.00



D 2063.

QUEEN'S COLORED LIQUID INKS.

	Black.	Blue.	Green.	Red.	Carmine.
Price, per bottle.	\$0.30	\$0.30	\$0.30	\$0.30	\$0.60

D 2064.

HIGGINS' AMERICAN DRAWING INK.

General and Waterproof, per bottle.....	\$0.40
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D 2065.

INK SLABS.

Three holes or cups and one slanting division.

Size in inches.....	3 $\frac{3}{4}$ x2 $\frac{3}{8}$	4 $\frac{3}{4}$ x3
Price, each.....	\$0.25	\$0.60



D 2066.

INK SLABS.

Patent, with cover.

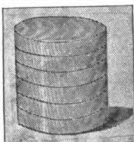
1 7/8 x 4 1/2 inches, each.....	\$0.75
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D 2067.

QUEEN'S INK SAUCERS.

Price, each.....	\$0.75
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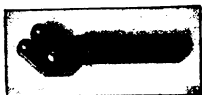
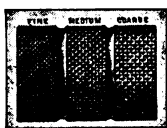
D 2068.

CABINET NESTS.

Containing five Saucers and Covers.

Diameter, inches.....	21½	31¼
Price, per nest.....	\$0.80	\$1.00

PRATT & WHITNEY'S TOOLS.



D 2082. KNURLING TOOL.

Is designed for checking cylindrical pieces that they may be held firmly by hand. Any desired length and diameter can be checked after the manner of turning in an engine lathe with continuous feed. The holder is jointed, that the knurls may center themselves, and be used in a weighted lathe without an extra weight being applied to the carriage to hold it in position. Knurls of three pitches are carried in stock; finer and coarser to a limited degree can be furnished to order, at special prices.

Price of holder only, 1x1-2x6 inches; weight, 16 ounces...\$4.00

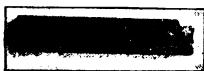
Price of holder with one pair of knurls; weight, 17 ounces 4.50

Extra knurls, per pair, weight, 1 ounce..... .75

All knurls used in same holder.

The tool will be mailed to any point in the United States on receipt of list price. The pitch of the knurled cut, measured parallel to axis of the work, is about 20 to the inch for fine knurls, 12 for medium, and 8 for coarse.

D 2083. JOHNSON'S PATENT CUTTING-OFF TOOL, FOR LATHE, PLANER AND SCREW MACHINE USE.



This tool was designed to take the place of the more expensive forged tools, which, after forging or drawing out by the smith, must be filed or ground into shape, taking much time. The holder

in this tool is a plain rectangular piece of machine steel, case-hardened, with recess in side, having the edge beveled to hold blades, which have their edges beveled to correspond with holder. The small screws at each end are to insure a tight fit to blade when in use, and to hold the blade when grinding. This tool is equally as good for planer as for lathe work, being as easily handled as a forged tool. Having no projection, they are especially adapted for screw machines. The blades are of special steel made for this purpose. Small sizes for foot-power lathes. Blades must be ground square on top for a distance equal to depth of cut. In making blades concave on sides, the greatest amount of clearance is obtained with the least reduction in strength.

HOLDERS (with one blade).

No.	Height.	Th'kness.	Length.	Price.	No.	Height.	Th'kness.	Length.	Price.
00	3-4	5-16	4 1-2	\$2.50	2	1 1-4	15-32	6	\$2.50
0	1	5-16	5	2.50	3	1 3-8	9-16	6 1-2	3.00
1	1 3-16	1-2	6	2.50	4	1 11-16	5-8	6 1-2	3.25

D 2084. KNURLING TOOL FOR SCREW MACHINE.

List of Blades, Johnson Cut-Off Tool, to Any Degree of Accuracy.



The above cut shows a Johnson Cut-Off in use with our Screw Machine Knurling Tool.

These are made in three sizes, Nos. 1, 2 and 3.

Price with one Knurl, \$4.50 for either size.

No.	Thickness.	Width.	Price.
00	1-32, 3-64, 1-16, 5-64	1-2 in.	40 cts.
0	1-16, 3-32, 1-8	11-16 in.	40 cts.
1 and 2	1-16, 3-32, 1-8	13-16 in.	30 cts.
	5-32		35 cts.
	3-16		40 cts.
	7-32		45 cts.
3 and 4	1-4	1 in.	50 cts.
	3-32		40 cts.
	1-8		45 cts.
	3-16		50 cts.
	1-4		55 cts.
	5-16		65 cts.

Screws, 3 cents each; 30 cents per dozen.

D 2085. ELLIOTT'S CUTTING-OFF TOOL.



These are very useful tools in a machine shop, may be used in any lathe, or by hand, operated same as pipe cutter. The cut represents No. 2 tool. The cutter is operated by pressure on the handles. The cutter of No. 1 tool is operated by

means of a screw and hand wheel.

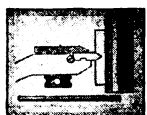
No. 1, cuts from 9-16 to 2 in.; price, with 1 blade.....\$10.00

" 2, " 3-16 to 1/2 " " " 2 blades..... 5.00

Extra Cutters, No. 2, each..... .15

" 1.....1-16 3-32 1-8 5-32 3-16 7-32 1-4

Price, each.....30c. 30c. 30c. 35c. 40c. 45c. 50c.



D 2096.

Thread Tool with V Cutter and Clamp Pin.

cutter to sharpen. Forming tools and special thread tools made to sample, drawing or templates, at special prices. All cutters for new tool will fit either Nos. 1, 2 or 3 holder.

SHARP V AND U. S. STANDARD.	
No. 1 Holder, with one cutter, $\frac{3}{4} \times \frac{3}{8} \times 5\frac{1}{4}$ -inch, 10 $\frac{1}{2}$ oz.	\$2.75
" 2 " " " " 1 $\times \frac{1}{2} \times 6$ -inch, 19 oz.	2.75
" 3 " " " " 1 $\frac{1}{2} \times \frac{3}{8} \times 8\frac{1}{2}$ -inch, 2 lbs. 14 oz.	5.00
Cutters, single-point, 4 to 20 pitch, 15-16 $\times \frac{1}{4} \times 2\frac{1}{2}$ -inch, 1 $\frac{1}{4}$ oz.	.40
" " " " 3, 3 $\frac{1}{4}$, 3 $\frac{1}{2}$ pitch, 1 1-16 $\times 11$ -32 $\times 2\frac{1}{2}$ -inch, 3 oz.	.75
" " chasers, 4, 4 $\frac{1}{2}$, 5, 5 $\frac{1}{2}$, 4 $\frac{1}{2}$ oz.	1.20
" " " 6 (4 oz.), 7, 8 (2 oz.)	1.00
" " " 9, 10, 11, 12, 13, 2 oz.	.90
" " " 14, 16, 18, 20, 1 $\frac{1}{4}$ oz.	.90
Center turning tool, 2 $\frac{3}{4}$ oz.	.90
Single offset cutter, 1 $\frac{1}{4}$ oz.	.40
Double " 3 oz.	1.00
Forming tools for quarter circles, $\frac{1}{4}$, 5-16, $\frac{3}{8}$, rad., 2 $\frac{1}{4}$ oz.	2.25
" " " " $\frac{1}{2}$ and $\frac{3}{8}$, rad., 4 oz.	2.50
" " " " half circles, $\frac{1}{4}$, 5-16, $\frac{3}{8}$, rad., 2 $\frac{1}{4}$ oz.	2.50
" " " " $\frac{1}{2}$ and $\frac{3}{8}$, rad., 4 oz.	3.00

WHITWORTH STANDARD THREAD.

Cutters, single-point, 4 $\frac{1}{2}$ to 20 pitch, ea.	\$1.00	Strap Adj. Screw, $\frac{1}{4}$ oz., ea.	\$0.12
" chasers, 4 $\frac{1}{2}$, 5, 6, 7, 8.....	1.75	Upright " " $\frac{1}{4}$ " ..	.08
" " 9, 10, 11, 12	1.50	Nut, $\frac{3}{4}$ oz.	ea. .15
" " 14, 16, 18, 20.....	1.35	Clamp Pin, $\frac{1}{2}$ oz.	" .03
Strap Bolt, 1 $\frac{1}{4}$ oz. "	.50		

In ordering cutters, be particular to name the holder, or state on which side the slot is, as the top of cutter is looked upon from the rear. The No. 2 Holder, made straight, is carried in stock.

Only a few of the forms that may be made are shown in the cuts. Obtain the best results by chamfering chasers, as shown in cut. For left-hand threads, chamfer the opposite side from that shown in cut. The U. S. Standard thread has flat sides, at an angle of 60 degrees to each other, with top flattened and bottom filled in $\frac{1}{8}$ of the pitch. The diameter is standard, invariably, not 1-64 or 1-32 oversize.

D 2097.

RHODES' SQUARE THREADING TOOL.



Cuts represent a convenient and economical holder and tool for cutting square threads. Right-hand threads are cut with one end of holder forward. By simply reversing holder and cutter, left-hand threads may be cut. The strap which clamps the cutter has an elongated hole, and adjusts itself to different widths of cutter, pressing the cutter against straight side of holder, and holding it rigidly in place. The cutters have clearance on side. When nice work is desired, a cutter one size smaller than that required for finishing can be used for roughing out. Should a cutter require sharpening before the thread is finished, it can be taken out and ground without disturbing the holder; then, when replaced, it will be exactly right to resume its cut, which is a great advantage. Dimensions of holder, $\frac{1}{2} \times 1\frac{1}{2} \times 5\frac{1}{2}$. Holder, with one cutter, for any number of threads per inch in list; weight, 14 ounces; price, \$3.50. Single cutters, for any of the following threads, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16; price, 40 cents.

Weight of holder and set of eleven cutters, in box, 15 $\frac{1}{4}$ ounces; price, \$9.00.

Weight of cutters—No. 3, $\frac{1}{2}$ ounce; No. 6, $\frac{1}{4}$ ounce; No. 9, $\frac{1}{8}$ ounce.

Weight of strap, $\frac{1}{2}$ ounce; price, 50 cents.

Weight of screw (of steel), $\frac{3}{8}$ ounce; price, 10 cents.

Cutters of special pitches are furnished at special prices. That proper clearance may be had, cutters are regularly made one two-thousandths inch wider than they should be to cut the groove the exact width of the land for any given pitch. An order for cutters should state whether they are for cutting taps or screws. Keep tools sharp.

NEW THREADING TOOL.

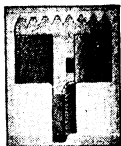
Combines cheapness with all essential points in a thread-cutting and forming tool. All parts of holder are finished accurately before hardening, there being no grinding after hardening, as with the Gardner and Wood-bridge tool. Cutters have 15 degrees clearance from perpendicular, which is ample for nearly all threads required, and the amount that experience has taught will wear the best on various metals. The same single-point cutter is used for right and left-hand. Threads can be cut very close to a shoulder. Simply grind top of

Double Offset.

Single Offset.

Gardner
Opening
Die
Head
Cuts
Exact
Threads.

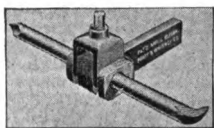
This Chaser Slotted for New Holder.



Chamfered for Right-Hand Thread.



D 2108. PATENT BORING AND INSIDE THREADING TOOL.



Cutter-bars, for inside threading are furnished for either U. S. Standard or sharp V threads, and may be ground many times without changing their shape. Size of shank, $\frac{1}{2} \times 1\frac{1}{2}$. Parts interchangeable. The holder is made of steel. The screws are thoroughly hardened. The largest cutter is made with a drill point, to be used as a *starter*; a twist drill may then be inserted in the holder, a hole drilled and finished to size with one of the cutter-bars, and, if required, threaded, without removing the holder from the tool-post. The cutter-bars, made from best tool steel, carefully hammered and tempered, may be set to cut at any side of the hole, are round in section, and straight, their horizontal alignment with the centers of the lathe is assured by the construction of the holder, and, in using, it is only required to set them parallel with the ways of the lathe.

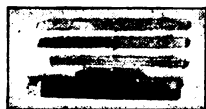
PRICE LIST.

Holder, with three cutters for boring; weight, 59 ounces.....	\$2.50
Cutter No. 1, 5-16 diameter, 8 inches long, for boring; weight, $3\frac{1}{2}$ ozs....	.20
For inside threading; weight, $3\frac{1}{2}$ ounces.....	.50
Cutter No. 2, bars $\frac{1}{2}$ diameter, 9 inches long, for boring; weight, $9\frac{1}{2}$ ozs. ....	.30
For inside threading; weight, $9\frac{1}{2}$ ounces.....	.60
Cutter No. 3, bars $\frac{3}{4}$ diameter, 10 inches long, for boring; weight $15\frac{1}{2}$ ozs. ....	.50
For inside threading; weight, $15\frac{1}{2}$ ounces.....	.80

No extra charge for cutters of special length or size, except for extra weight of steel. Parties ordering inside threading tool should state pitch of thread and diameter of holes in which they are to be used.

Malleable
Thumb
Screws
Carried in
Stock.

D 2109. WOODBRIDGE LATHE AND PLANER TOOL.



Some of the Advantages:

The cutters being long, their life is equal to that of an ordinary tool forged seven times, the cost of such forging being estimated at \$1.15. One pound of tool steel in this style of tool takes the place of five pounds in the ordinary tool, is used up within one ounce, and is not liable to loss from re-forging. After each forging the ordinary tool requires considerable grinding to reduce it to shape, whereas this new tool is made to shape, thus saving these grindings. The bevel on top of cutters is suitable for steel and cast iron. Parties working wrought iron should grind the cutting edge a little thinner, which allows faster feed.

This tool being supported and backed up close to the cutting edge, and having no vertical projection, will stand heavier cuts and faster feeds than ordinary tools. The new tools can, without alteration of form, be used in a planer as well as in a lathe. If the tools are kept ground in stock, the workman has but to slip in a new tool as the old one becomes dull, no adjustment for height being necessary, as in the forged tool.

The No. 0 and 00 lathe tools are adapted for amateurs and watch-makers. This tool consists of holder and cap (both case-hardened steel) and four cutters made of best tool steel.

PRICES, COMPLETE.

No. 00, 5-8 x 5-16 x $4\frac{1}{2}$ inch; weight, $6\frac{1}{4}$ ounces.....	\$2.50
Extra cutters, each.....	.25
No. 0, 3-4 x 5-16 x $4\frac{1}{2}$ inch; weight, $6\frac{1}{4}$ ounces.....	2.50
Extra cutters, each.....	.25
No. 1, $1\frac{1}{2}$ x $\frac{1}{2}$ x 6 inch; weight, $20\frac{1}{4}$ ounces.....	3.00
Extra cutters, each.....	.25
No. 2, $1\frac{3}{4}$ x $\frac{1}{2}$ x 6 inch; weight, 24 ounces.....	3.00
Extra cutters, each.....	.25
No. 3, $1\frac{1}{2}$ x $\frac{3}{4}$ x 8 inch; weight, $52\frac{1}{2}$ ounces.....	4.00
Extra cutters, each.....	.40
No. 4, 2 x 1 x 8 inch; weight, 6 pounds.....	6.00
Extra cutters, each.....	.50
No. 5, $2\frac{1}{4}$ x 1 x 8 inch; weight, 6 pounds.....	7.00
Extra cutters, each.....	.50
No. 6, $2\frac{3}{4}$ x $1\frac{1}{4}$ x 10 inch.....	9.00
Extra cutters, each.....	.75

MUSHET STEEL CUTTERS FOR HOLDERS No. 1 TO No. 6.

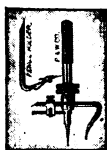
No. 1, each.....	\$0.95	No. 3, each.....	\$1.20	No. 5, each.....	\$3.40
No. 2, each.....	.95	No. 4, each.....	3.40	No. 6, each.....	7.60

PRICE AND WEIGHT OF PARTS.

	No.00.	No.0.	No.1.	No.2.	No.3.	No.4.	No.5.	No.6.
Body of holder, wt., oz.	$1\frac{1}{2}$	$2\frac{1}{2}$	$7\frac{1}{2}$	$10\frac{1}{2}$	$20\frac{1}{2}$	$20\frac{1}{2}$	$20\frac{1}{2}$	...
Cap of holder, ".....	$\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	5	$10\frac{1}{2}$	$10\frac{1}{2}$	$17\frac{1}{2}$
Cutters, each, ".....	1	1	$2\frac{1}{2}$	$2\frac{1}{2}$	$6\frac{1}{2}$	$15\frac{1}{2}$	$15\frac{1}{2}$	$26\frac{1}{2}$
Body of holder, price.....	\$1.00	1.00	1.50	1.50	1.60	3.00	3.50	4.00
Cap of holder. ".....	.50	.50	.50	.50	.80	1.00	1.50	2.00

D 2120.

KIDD IMPROVED DIVIDER.



Some of the special advantages of this tool are: 1st. It takes the place of from two to five pair of ordinary dividers. 2d. There is theoretically no limit to circles that can be drawn. 3d. It is quickly and easily adjusted to different size circles and spacing. 4th. It is made of the best tool steel, and points carefully hardened. 5th. It can be used with pencil. 6th. It is indispensable for cutting circles in soft metals for models, etc. 7th. The points are parallel and vertical while in use, making it very easy to set it to a scale.

As all workmen know, who have occasion to use dividers, it is difficult to lay out a perfect circle, on steel, or other hard metal, with the ordinary divider, and only men accustomed to the work can do it, on account of the point on center punch mark jumping out as the pressure is put upon the point doing the work. Not so with this tool; the most inexperienced workman can use this, it is so rigid, the point of resistance so near the point doing the work, and as they remain parallel and vertical, little chance is given for the points to either jump out or spring away from the desired position.

Divider, with bars 1 3/4 and 5 inches long, in box; weight, 2 1/2 oz...Price, \$1.50

With 5-inch bar, 7-inch circles may be drawn.

Bars, 1 3/4 inches long, 1-4 oz.....	price, \$0.25	Malleable
Bars, 5 inches long, 1-2 oz.....	“ .30	Thumb Nuts
Long bar, for 24-inch circle; weight, 1 oz.....	“ .50	Carried in
Lead pencil holder, short; weight, 1-2 oz.....	“ .50	Stock.
Lead pencil holder, for 24-inch circle; weight, 1 oz.....	“ .75	

Prices.—Adjusting nut, 10 cents; binding screw, 8 cents; adjusting screw, with yoke, nut and binding screw, 30 cents; large binding nut, 20 cents.

Extra length bars made to order; weight of box, 3-4 oz.

D 2121.

STANDARD “KNIFE EDGE” STRAIGHT EDGES.



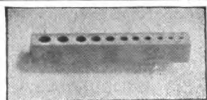
The cut represents a set consisting of a 7-inch test bar, and three straight edges, 6 1/2, 4 1/2 and 3 1/4 inches long, respectively, with non-conducting handle.

The test bars are made of glass, cased in felt and leather as a protection against accidents and changes of temperature caused by handling. The straight edges are made of tool steel, in shape most convenient for use, combining strength with lightness and hardened at the straight edge only.

A non-conducting handle, fitting all three sizes of straight edges, will be furnished, if desired, and is essential when these tools are used on work requiring great accuracy. They are finished at a temperature not lower than 75 degrees or higher than 85 degrees Fah., and will be found most accurate within that limit. Glass is adopted for the test bars, and it is less affected by changes of temperature than any other available material.

Set (test bar and three straight edges), in velvet-lined case, wt., 20 oz..	\$12.00
Test bar, 7 inches long, in cloth-covered box.....	5.50
No. 1 Straight Edge, 3 1/4 inches long, in cloth-covered box.....	1.50
No. 2 Straight Edge, 4 1/2 inches long, in cloth-covered box.....	2.00
No. 3 Straight Edge, 6 1/2 inches long, in cloth-covered box.....	2.75
Non-conducting handle for straight edges; weight, 8 1/2 oz.....	.50
Velvet-lined case for set complete; weight, 8 1/2 oz.....	1.00
Cloth-covered boxes for test bar.....	.20
Cloth-covered boxes for straight edges.....each,	.15

Weight straight edges, No. 1, 1 oz.; No. 2, 1 1/2 oz.; No. 3, 3 oz. Weight cloth-lined boxes, No. 1, 1-2 oz.; No. 2, 3-4 oz.; No. 3, 1 1/4 oz. Weight glass test bar, 6 1/4 oz.



D 2122. BOSTON MILLING TOOL.

In the ordinary method of milling wire in the lathe a tool is required for each diameter to be cut. The tool is made of the best steel and hardened, having holes of various sizes, the smallest being at

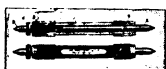
one end, and the other holes increasing in size throughout the length of the block to correspond with standard wire gauges. The block is formed with a dovetail groove in which fits a steel slide provided with a cutting edge at each end, which is secured in the desired position by means of a set screw.

To use the tool the cutter is set over the hole according to the amount to be taken off the wire; the wire is then secured in the lathe chuck and the end inserted in the hole in the tool corresponding to its diameter. The tool is held in the hand and as the wire revolves cuts it to the required size. It cuts with great rapidity and leaves a very smooth surface if the cutter is properly ground. By the use of this tool the numerous mills now used in milling wire are dispensed with, as the cutter can be set to take off the slightest shaving or to cut any and all depths required, so that a single wire can be reduced from its greatest diameter to a very fine wire.

Large size will mill from 7-16 in. down; small size, from 1/8 in. down. Each, \$2.50

D 2133.

ADJUSTABLE CALIPER GAUGE.



This little tool will be found a convenient and economical substitute for the wire, usually made by repeated filing and "drawing," to get the exact size. Two "chucks" are arranged, one on each end of a hollow tube. The hole in one end of tube is smooth, so that by loosening the chuck, the wire may be quickly slid out or in. In the other end a fine thread is tapped, and a knurled wire is threaded to fit. In use, in taking a size, the smooth wire is moved out to give nearly the diameter required, and fastened; then the fine adjustment is made by the threaded wire. Ends of wire are hardened. Any large diameter may be taken by changing the plain wire for a longer one. This tool will be found convenient in taking distances between uprights, etc., being positive. Holder, full nickel plate. Diameter of holder, 1.4 inch. Diameter of steel wire, 5-32-inch.

No. 1, with three wires; shortest dimension, 3 inches; longest dimension, 6 3-4 inches; in box; weight, 2 1-4 oz. Price, \$0.90

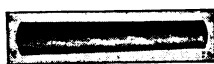
No. 2, with three wires; shortest dimension, 6 inches; longest dimension, 16 inches; in box; weight, 5 1-4 oz. Price, 1.00

Wires of any length will be furnished at 1 cent per inch.

WEIGHTS.—No. 1 gauge, without wires, 3-4 oz.; No. 2 gauge, without wires, 1 oz.; wires, 2-inch, 1-4 oz.; 3 3-8-inch, 3-8 oz.; 5-inch, 1-2 oz.; 9-inch, 3-4 oz.; 13-inch., 1 1-4 oz.; 20-inch, 1 3-4 oz.

D 2134.

STANDARD STEEL TAPER PINS.



Taper one-quarter inch to the foot followed in absence of model and instructions. In giving sizes other than those included in list, measure

at largest point.

PRICE PER HUNDRED.

Number.....	0	1	2	3	4	5	6	7	8	9	10
Diameter at Large End.....	.156	.172	.193	.219	.250	.289	.341	.409	.492	.591	.706
Approximate Fractional Sizes..	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
Longest Limit of Length.....	1	1 1/4	1 1/2	1 3/4	2	2 1/4	3 1/4	3 3/4	4 1/2	5 1/4	6
From 3/4.....	1.80	2.00	2.10	2.30	2.50	2.75	3.00	.....	.....	.....	.....
1.....	2.05	2.25	2.35	2.55	2.75	3.00	3.25	3.75	.....	.....	.....
1 1/4.....	2.50	2.60	2.80	3.00	3.25	3.50	4.00	4.65	.....	.....
1 1/2.....	2.85	3.05	3.25	3.50	3.75	4.25	5.00	7.00	9.00
1 3/4.....	3.30	3.50	3.75	4.00	4.50	5.40	7.50	9.50
2.....	3.75	4.05	4.35	4.75	5.80	8.00	10.00
2 1/4.....	4.40	4.75	5.25	6.25	8.60	10.75
2 1/2.....	5.20	5.75	6.75	9.20	11.50
2 3/4.....	5.70	6.25	7.25	9.80	12.25
3.....	6.25	6.75	7.80	10.50	13.25
3 1/4.....	6.75	7.25	8.40	11.20	14.25
3 1/2.....	7.75	9.00	11.90	15.25
3 3/4.....	8.25	9.60	12.60	16.25
4.....	10.20	13.30	17.25
4 1/4.....	10.80	14.00	18.25
4 1/2.....	11.40	14.70	19.25
4 3/4.....	15.40	20.25
5.....	16.10	21.25
5 1/4.....	16.80	22.25
5 1/2.....	23.25
5 3/4.....	24.25
6.....	25.25

D 2135.

STANDARD TAPER-PIN REAMERS.

TAPER 1/4 INCH PER FOOT.



We Cut
Sheet
Brass
Special
Sizes to
Order.

Size No.	Di'm't'r at Small End. Inches.	Length of Flute. Inches.	Total Length. Inches.	Price. Each.	Size No.	Di'm't'r at Small End. Inches.	Length of Flute. Inches.	Total Length. Inches.	Price. Each.
0	0.135	1 5-16	2	\$1.00	7	0.331	4 7-16	6 1-16	\$2.50
1	0.146	1 9-16	2 3-8	1.00	8	0.398	5 1-4	7 1-16	3.00
2	0.162	1 13-16	2 11-16	1.25	9	0.482	6 1-8	8 1-8	3.50
3	0.183	2 1-16	3	1.50	10	0.581	7	9 1-2	4.00
4	0.208	2 3-8	3 7-16	1.75	11	0.706	8 1-4	11 1-4	4.75
5	0.240	2 7-8	4 1-8	2.00	12	0.842	10	13 3-8	5.50
6	0.279	3 5-8	5	2.25	13	1.009	12	16	6.50

(Diameter at small end is taken 1/8 inch from extreme end.)

These Reamer sizes are so arranged that each "overlaps" about 1/2 inch the size smaller; the taper being the same, the advantage thus secured is obvious. Special or larger sizes made to order.

SLOCUMB'S MICROMETERS.

D 2146. STANDARD INSIDE MICROMETER CALIPER, No. 10.



This tool differs from our Inside Micrometer Gauge, in its being adapted for standard micrometer. The micrometer screw has a range of $\frac{1}{4}$ inch and with the set of 6 graduated wires will measure by thousandths from $2\frac{1}{4}$ to 13 inches. All points are as hard as it is possible to make them, so with proper usage the tool will not require adjusting for a long time.

TO ADJUST THE TOOL AFTER WEAR.

We have provided a test line on each wire as shown by the above cut. The set of wires should be inspected to see if they have worn equally. To do this, first turn the micrometer out to about the extent of its range, then place one of the wires in the tool, point first, and push it down till it bottoms, then by turning the micrometer the wire can be pushed out till the test line matches with line on body of tool. Now without disturbing the micrometer, try the other wires of the set in place of the one just used, and see if they measure the same, if not the longer ones must be lapped to the length of shortest. When the set of wires are an equal length from this test line to point, the tool should be adjusted to some standard gauge, by turning the tip with the short wire furnished, inserted in the hole shown in the cut. In doing this the barrel should be held in a vise between two blocks of wood, as the tip is made a tight fit.

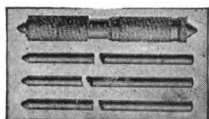
In setting the tool to its smallest size ($2\frac{1}{4}$) the micrometer can be used in adjusting the lines to match. This is because the wire projects so little, it is not convenient to adjust it with the fingers.

We warrant this tool to be accurate and well made in every respect.

Price, in morocco case.....\$6.00

Try our
Brush
Copper for
Electrical
Work.

D 2147. INSIDE MICROMETER GAUGE, No. 11.



The accompanying cut illustrates a tool intended to measure inside diameters above $2\frac{1}{4}$ inches. The micrometer screw has a range of $\frac{1}{4}$ inch which enables allowances, or differences, of this amount, or less, to be accurately measured in thousandths; the diameter or length, only being limited by the length of wire, which for long lengths can be readily cut from standard 5-32 inch steel wire, wires to measure diameters to 9 inches being furnished with the tool. The value of the micrometer adjustment will be quickly appreciated by a machinist, for he can not only know that one hole is the same size as another, or of his outside calipers, but he can know in thousandths of an inch how much larger or smaller the hole is that he measures.

This is a very important matter, as a hole is seldom made the exact size of the shaft it is intended to fit, for there is always some condition of fit wanted, such as a "running fit," in which case the hole is made larger than the shaft; a "driving," "force" or "shrink" fit, in which the shaft is made larger than the hole. All these different conditions are met to a fair certainty by machinists of experience by methods of guessing, that is: "Light between calipers," feeling the spring of calipers and so judging somewhere near the amount they spring, noticing the amount the inside gauge will swing in a hole when one end is held still—for a loose fit, and many other ways, all of which depend entirely upon the skill and experience of the man who uses them. The Inside Micrometer Gauge makes such work more easily done, and good results more certain. This tool does not measure standard sizes.

We warrant this tool to be well made and durable in every respect, and we invite comparison for accuracy with other accurate tools.

Price of complete tool.....\$1.75 | Extra wires, per inch.....\$0.02



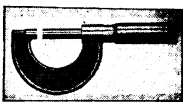
D 2148.

This illustration represents an extension intended for use with the Inside Micrometer Gauge. It consists of a piece of brass tube having its ends internally threaded, to one end of which is fitted a pointed screw tip and in the other a threaded sleeve, which fits the internal thread in the micrometer thimble.

These extensions can be made of most any length, and for diameters or lengths greater than 9 inches are much better than extra long rods. A long rod is furnished with each extension which will run through the micrometer and through the extension tube as far as the pointed tip, so (with the extension) one rod covers a great range of sizes. They are nickel plated all over, to give the brass tube the same color as the steel tips.

A $6\frac{1}{4}$ inch extension, with rod, measures from 9 inches to $16\frac{1}{4}$ inches, and a 14 inch with rod, from $16\frac{1}{4}$ inches to 32 inches.

No. 1. Price of $6\frac{1}{4}$ -inch.....\$1.00 | No. 2. Price of 14-inch.....\$1.25

D 2172. OUTSIDE MICROMETER CALIPER, No. 17.

The illustration is of a new micrometer caliper having a bow of I section and with its anvil formed solidly with the frame which is of steel, the adjustment commonly made by an anvil screw is made in this tool at the other end. The cut shows the one inch caliper which measures from 0 to 1 inch by thousandths. The 2-inch size starts at 1 inch and measures 2 inches, it being the same as the 1 inch in other respects.

The anvil, being the same size as the screw and end of the frame, makes the caliper convenient for measuring very close to a shoulder, and this, with the proportion of opening of the bow, allows a shoulder 3-16 inch high to be measured up to the full capacity of the tool. The anvil is also made higher than common so that measuring can be done in a recess or back of a rib or other slight projection.

There are no decimal equivalents stamped upon the bow or frame, a similar result being accomplished in another way. As (not very plainly) brought out in the cut, graduations on the under side are extended on every $\frac{1}{8}$ inch division or those that read decimally .125 inch. These lines are numbered on the lower side from 1 to 8, so that the tool is readily set by eighths without considering the decimal graduation at all, and without any manner of calculation. Decimal equivalents within $\frac{1}{8}$ inch are stamped upon the thimble, so if a person chooses he need not use the decimal system, except for measurements between eighths, but this arrangement in no way interferes with reading the tool in decimals the regular way. They are made for everyday use in the machine shop, so some points of finish not necessary to the satisfactory working of the tool are omitted. The bows or frames, like ordinary snap gauges, are not finished, further than being nicely jappedanned. A special machine has been constructed for cutting the threads upon the screws, and with this accurate and smooth threads are secured upon unannealed tool steel.

They are regularly made in two sizes (1 inch and 2 inches) but larger sizes to 6 inches are made to order at reasonable rates. They are warranted well made and accurate.

1 inch, price each.....	\$3.50	Morocco Case for 1 inch.....	\$0.75
2 " " " " " " " " " " " "	3.50	" " " " " " " " " " " "	1.00
End measure for adj. 2 in. if desired	.75	Prices of larger sizes on application.	

D 2173. LARGE MICROMETER CALIPERS.

The illustration represents a 6 inch micrometer caliper. This caliper measures all sizes between 5 and 6 inches and only differs from our smaller ones in the size of bow or frame. We make a 5 inch which measures between 4 and 5 inches, a 4 inch which measures between 3 and 4 inches and a 3 inch which measures between 2 and 3 inches, all of the same style with bows or frames in proportion to the size.

Frames for 4 inch, 5 inch and 6 inch sizes are steel castings; 1 inch, 2 inch and 3 inch sizes are drop-forged from bar steel. 4 inch, 5 inch and 6 inch sizes are not always kept in stock, but can, usually, be furnished at short notice.

Price of 3 inch.....\$5.00 | 4 inch.....\$6.00 | 5 inch.....\$7.00 | 6 inch.....\$8.00

MICROMETER CALIPERS FOR MACHINE WORK.

From 0 inch to 3 inch.



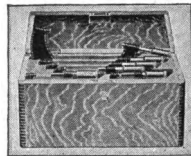
D 2174. No. 18.
In Morocco Case, \$12.00.

We believe a set of micrometer calipers, measuring from 0 to 6 inches will prove invaluable in the tool room of any modern machine shop.

Only a few years ago the little 1 inch micrometer caliper first made its appearance in machine shops and was regarded more as a curiosity than anything else but, as men learned its uses, it soon showed its value, and we predict that the time is not far distant when all sizes will be in every day use. Many people have got the idea that micrometer calipers are expensive, unreliable and difficult to use, and they make a great mistake on all three of these points. Considering the great range of sizes that a micrometer caliper measures, it is by far the cheapest standard gauge made.

The micrometer caliper, when properly used, is a labor and time saving tool; and there is as much difference between it and the old fashioned calipers or gauges, in points of convenience, as there is between working in light, or in darkness.

From 0 inch to 6 inch.



Special
Drills,
Made to
Order.

D 2175. No. 19.
In Polished Oak Case,
Made to Order, \$35.00.

JOHN M. ROGERS' GAUGES.

Special
Taps
Made to
Order.

GENERAL NOTES RELATING TO GAUGES.

The cost of gauging implements of any kind depends upon the accuracy attained, and as the requirements in this respect vary, a scale of precision has been adopted within which our tools are guaranteed, viz.:

CLASS B, 10000, AND CLASS C, 5000 OF AN INCH.

Implements are adjusted at a temperature of 75 degrees.

Gauges are made of high-grade steel, with the points and heels carefully hardened. Their points are not rounded, but have a parallel bearing of from $\frac{1}{8}$ to $\frac{3}{4}$ of an inch in length; they should be inspected at regular intervals, and tested by the Corrective Gauge, recommended to accompany every set of Caliper Gauges.

Caliper Gauges are graduated by sixteenths from one-fourth to six inches; but other and irregular, as well as millimeter sizes can be furnished.

Sets may be had to include any desired number of gauges up to twelve inches, and of any required range.

GAUGES ARE ALL MADE OF CLASS B, but when passed by a final inspection some are reduced to Class C, by reason of fire cracks or other slight imperfections, these, however, meet all requirements in first-class fitting. Gauges in Class C will not be replaced if they break from fire cracks.

A SET OF CALIPER GAUGES, WITH A CORRECTIVE STANDARD for keeping them in proper adjustment, constitutes a set of working implements sufficient to meet every requirement for maintaining uniform sizes.

D 2186.

FIXED CALIPER GAUGES. Combined Pattern.

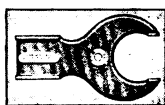


Fig. 6.

Are made of steel with points and heels hardened to prevent wearing. Large contact surfaces at both ends. The internal and external gauges, either the same size or of different sizes, as may be desired. Either end varied to suit special requirements. Limit Gauges made to order. There are now over 65,000 of our gauges in use.

Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.	Size.	Class B.	Class C.
1-4	\$1.44	\$1.15	1 1-2	\$2.85	\$2.29	2 3-4	\$4.43	\$3.55	4	\$5.93	\$4.75
5-16	1.44	1.15	1 9-16	2.93	2.35	2 13-16	4.51	3.61	4 1-8	6.05	4.85
3-8	1.44	1.15	1 5-8	3.01	2.41	2 7-8	4.58	3.67	4 1-4	6.17	4.94
7-16	1.44	1.15	1 11-16	3.09	2.47	2 15-16	4.66	3.73	4 3-8	6.29	5.04
1-2	1.44	1.15	1 3-4	3.17	2.54	3	4.73	3.79	4 1-2	6.41	5.13
9-16	1.53	1.23	1 13-16	3.25	2.60	3 1-16	4.81	3.85	4 5-8	6.53	5.23
5-8	1.62	1.30	1 7-8	3.33	2.67	3 1-8	4.88	3.91	4 3-4	6.65	5.32
11-16	1.71	1.37	1 15-16	3.41	2.73	3 3-16	4.96	3.97	4 7-8	6.77	5.42
3-4	1.80	1.44	2	3.49	2.79	3 1-4	5.03	4.03	5	6.89	5.51
13-16	1.89	1.52	2 1-16	3.57	2.86	3 5-16	5.11	4.09	5 1-8	7.01	5.61
7-8	1.98	1.59	2 1-8	3.65	2.92	3 3-8	5.18	4.15	5 1-4	7.13	5.71
15-16	2.07	1.67	2 3-16	3.73	2.98	3 7-16	5.26	4.21	5 3-8	7.25	5.81
1	2.16	1.74	2 1-4	3.81	3.05	3 1-2	5.33	4.27	5 1-2	7.37	5.90
1 1-16	2.25	1.81	2 5-16	3.89	3.11	3 9-16	5.41	4.33	5 5-8	7.49	6.00
1 1-8	2.34	1.88	2 3-8	3.97	3.18	3 5-8	5.48	4.39	5 3-4	7.61	6.09
1 3-16	2.43	1.95	2 7-16	4.05	3.24	3 11-16	5.56	4.45	5 7-8	7.73	6.19
1 1-4	2.52	2.02	2 1-2	4.13	3.31	3 3-4	5.63	4.51	6	7.85	6.28
1 5-16	2.61	2.09	2 9-16	4.21	3.37	3 13-16	5.71	4.57			
1 3-8	2.69	2.16	2 5-8	4.28	3.43	3 7-8	5.78	4.63			
1 7-16	2.77	2.23	2 11-16	4.36	3.49	3 15-16	5.86	4.69			

Total cost of a set of Gauges, 1-4 to 4 inch, as per list, Class B.....	\$220.50
" " " " " 1-4 to 4 " " " C.....	176.69
" " " " " 1-4 to 6 " " " B.....	331.78
" " " " " 1-4 to 6 " " " C.....	265.72

When ordering please state clearly how sizes are to vary, whether by 16ths, 8ths or 4ths of inches, also what pattern of gauge is wanted. When not otherwise stated, Class "B" will be sent.

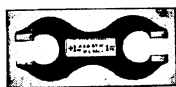


D 2187. STANDARD REFERENCE DISCS.

The Disc here shown is valuable for general use in testing holes, adjusting calipers and as a reference to prove dimensions within its range. Any size from $\frac{3}{8}$ to 6 inches can be furnished. The 1-4 and 5-16 inch are made either on a screw or handle.

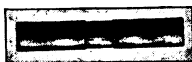
The width of disc increases with its diameter.

$\frac{1}{4}$ to 2 in., inclusive, each disc...	\$1.20	Above $4\frac{1}{2}$ in. to 5 in., each disc...	\$3.60
Above 2 in. to 3 in., " ...	1.60	" 5 in. to $5\frac{1}{2}$ in., " ...	4.80
" 3 in. to 4 in., " ...	2.10	" $5\frac{1}{2}$ in. to 6 in., " ...	6.00
" 4 in. to $4\frac{1}{2}$ in., " ...	2.80		



D 2200.

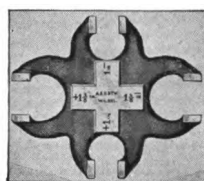
Fig. 13. Limit Gauge.



D 2202.

Fig. 15. Workshop Cylindrical Gauge.

LIMIT AND CYLINDRICAL GAUGES.



D 2201.

Fig. 14. Limit Gauge.

LIMIT GAUGES. Fig. 13.

Size	Price Each.
1-4 in.....	\$1.80
5-16 "	1.80
3-8 "	1.80
7-16 "	1.80
1-2 "	1.80
9-16 "	1.92
5-8 "	2.04
11-16 "	2.16
3-4 "	2.28
13-16 "	2.40
7-8 "	2.52
15-16 "	2.64
1 "	2.76
1 1-16 "	2.88
1 1-8 "	3.00
1 3-16 "	3.12
1 1-4 "	3.24
1 5-16 "	3.36
1 3-8 "	3.46
1 7-16 "	3.56
1 1-2 "	3.66
1 9-16 "	3.76
1 5-8 "	3.86
1 11-16 "	3.96
1 3-4 "	4.06
1 13-16 "	4.16
1 7-8 "	4.26
1 15-16 "	4.36
2 "	4.46
2 1-16 "	4.56
2 1-8 "	4.66
2 3-16 "	4.76
2 1-4 "	4.86
2 5-16 "	4.96
2 3-8 "	5.06
2 7-16 "	5.16
2 1-2 "	5.26

LIMIT GAUGES. Fig. 14.

Size	Price Each.
1-4 in.....	\$2.25
5-16 "	2.25
3-8 "	2.25
7-16 "	2.25
1-2 "	2.25
9-16 "	2.37
5-8 "	2.49
11-16 "	2.62
3-4 "	2.75
13-16 "	2.87
7-8 "	3.00
15-16 "	3.12
1 "	3.25
1 1-16 "	3.37
1 1-8 "	3.50
1 3-16 "	3.62
1 1-4 "	3.75
1 5-16 "	3.87
1 3-8 "	4.00
1 7-16 "	4.12
1 1-2 "	4.25
1 9-16 "	4.37
1 5-8 "	4.50
1 11-16 "	4.60
1 3-4 "	4.70
1 13-16 "	4.80
1 7-8 "	4.90
1 15-16 "	5.00
2 "	5.18
2 1-16 "	5.36
2 1-8 "	5.54
2 3-16 "	5.74
2 1-4 "	5.94
2 5-16 "	6.14
2 3-8 "	6.34
2 7-16 "	6.54
2 1-2 "	6.75

CYLINDRICAL GAUGES. Fig. 15.

Size	Price Each.
1-2 x 5-8	\$3.70
9-16 x 11-16	3.94
5-8 x 3-4	4.14
11-16 x 13-16	4.34
3-4 x 7-8	4.54
13-16 x 15-16	4.74
7-8 x 1 "	4.94
15-16 x 1 1-16	5.14
1 " x 1 1-8	5.34
1 1-16 x 1 3-16	5.54
1 1-8 x 1 1-4	5.64
1 3-16 x 1 5-16	5.74
1 1-4 x 1 3-8	5.84
1 5-16 x 1 7-16	5.94
1 3-8 x 1 1-2	6.04
1 7-16 x 1 9-16	6.24
1 1-2 x 1 5-8	6.44
1 9-16 x 1 11-16	6.64
1 5-8 x 1 3-4	6.84
1 11-16 x 1 13-16	7.00
1 3-4 x 1 7-8	7.16
1 13-16 x 1 15-16	7.36
1 7-8 x 2 "	7.56
1 15-16 x 2 1-16	7.76
2 " x 2 1-8	7.96
2 1-16 x 2 3-16	8.12
2 1-8 x 2 1-4	8.28
2 3-16 x 2 5-16	8.48
2 1-4 x 2 3-8	8.68
2 5-16 x 2 7-16	8.88
2 3-8 x 2 1-2	9.10
2 7-16 x 2 9-16	9.80
2 1-2 x 2 5-8	10.50

Parallel
Clamps
Make
Good
Drilling
Jigs.

D 2203. HOLLOW MILLS FOR CUTTING FIBER RODS.



Fig. 17.

Diam. of Hole.	Length.	Price Each.
1-8 in. to 1-4 in. inclusive.	1 3/4 in.	\$1.50
5-16 " to 7-16 " " "	2 1/8 " "	1.75
1-2 " to 5-8 " " "	2 1/4 " "	2.00
11-16 " to 7-8 " " "	2 1/2 " "	2.25
15-16 " to 1 1-16 " " "	2 3/8 " "	2.75
1 1-8 " to 1 1-4 " " "	2 3/4 " "	3.50

Mills can be sharpened by grinding the ends without materially changing the cutting sizes.

D 2204. CORRECTIVE GAUGE STANDARDS

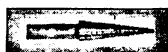
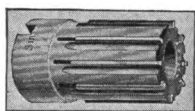


Fig. 4.

PRICES.

1/4 inch to 1 inch, inclusive, by 16ths, 13 sizes..\$18.50
1/4 inch to 2 inch, inclusive, by 16ths, 29 sizes.. 37.50

D 2210. SHELL REAMERS WITH ADJUSTABLE BLADES.**Fig. 10.**

The shell is of steel, and the blades of the best tool steel. From six to ten cutters are inserted in each reamer, and unevenly spaced, they are fitted into dove-tailed slots, the bottoms of which are inclined planes. By driving the blade towards the shank, the cutting diameter can be expanded to compensate for the wear. Straight or taper holes as may

be required. Reamers larger than 4 inches made to order. If for reaming brass, please so state. (*Morse Taper Hole. Diameter of small end of hole.)

Diam.	Length.	*Hole.	Price, Each.	Diam.	Length.	*Hole.	Price, Each.
5-8	2	3-16	\$ 2.30	2 7-8	4 1-2	1 1-4	\$13.50
11-16	2	3-16	2.30	2 15-16	4 1-2	1 1-4	14.00
3-4	2	3-16	2.43	3	4 1-2	1 1-4	14.50
13-16	2	3-16	2.70	3 1-16	4 1-2	1 1-4	15.00
7-8	2	3-16	3.09	3 1-8	4 1-2	1 1-4	15.50
15-16	2	3-16	3.48	3 3-16	4 1-2	1 1-4	16.00
1	2 1-2	1-2	3.87	3 1-4	4 5-8	1 1-2	16.50
1 1-16	2 1-2	1-2	4.26	3 5-16	4 5-8	1 1-2	17.00
1 1-8	2 1-2	1-2	4.65	3 3-8	4 5-8	1 1-2	17.50
1 3-16	2 1-2	1-2	5.04	3 7-16	4 5-8	1 1-2	18.00
1 1-4	2 1-2	1-2	5.43	3 1-2	4 5-8	1 1-2	18.50
1 5-16	2 1-2	1-2	5.83	3 9-16	4 5-8	1 1-2	19.00
1 3-8	3 1-4	3-4	6.35	3 5-8	4 5-8	1 1-2	19.50
1 7-16	3 1-4	3-4	6.88	3 11-16	4 5-8	1 1-2	20.00
1 1-2	3 1-4	3-4	7.41	3 3-4	4 5-8	1 1-2	20.50
1 9-16	3 1-4	3-4	7.58	3 13-16	4 5-8	1 1-2	21.00
1 5-8	3 1-4	3-4	7.77	3 7-8	4 5-8	1 1-2	21.50
1 11-16	3 1-4	3-4	7.96	3 15-16	4 5-8	1 1-2	22.00
1 3-4	3 1-4	3-4	8.15	4	4 5-8	1 1-2	22.50
1 13-16	3 1-4	3-4	8.34	4 1-16	5	1 3-4	23.00
1 7-8	3 1-4	3-4	8.50	4 1-8	5	1 3-4	23.50
1 15-16	3 1-4	3-4	8.68	4 3-16	5	1 3-4	24.00
2	4 1-4	1	8.75	4 1-4	5	1 3-4	24.50
2 1-16	4 1-4	1	9.00	4 5-16	5	1 3-4	25.00
2 1-8	4 1-4	1	9.25	4 3-8	5	1 3-4	25.50
2 3-16	4 1-4	1	9.50	4 7-16	5	1 3-4	26.00
2 1-4	4 1-4	1	9.75	4 1-2	5	1 3-4	26.50
2 5-16	4 1-4	1	10.00	4 9-16	5	1 3-4	27.00
2 3-8	4 1-4	1	10.25	4 5-8	5	1 3-4	27.50
2 7-16	4 3-8	1	10.50	4 11-16	5	1 3-4	28.00
2 1-2	4 3-8	1 1-4	10.75	4 3-4	5	1 3-4	28.50
2 9-16	4 3-8	1 1-4	11.00	4 13-16	5	1 3-4	29.00
2 5-8	4 3-8	1 1-4	11.50	4 7-8	5	1 3-4	29.50
2 11-16	4 1-2	1 1-4	12.00	4 15-16	5	1 3-4	30.00
2 3-4	4 1-2	1 1-4	12.50	5	5	1 3-4	30.50
2 13-16	4 1-2	1 1-4	13.00				

**Fig. 1. 0 to 4 in., 12 in., and 24 in.****D 2211. MEASURING MACHINES.**

This is a standard form of Measuring Machine for use in the tool room in preparing templates, reamers, man-

**Fig. 2. Prices upon application.**

drels, etc., etc. It will measure differences of the 1000ths of an inch. Adjustments in the machine provide for the wear of measuring points. Errors of the screw are corrected and marked. This machine, by means of a vernier attachment, will indicate variations of 2000ths of an inch, but measuring and indicating are radically different things, and are not to be confused.

Machine to measure from 0 to 4 inch without Test Bars..... \$ 60.00
 " " " " 0 to 12 inch with 2 " " 120.00
 " " " " 0 to 24 inch with 3 " " 150.00

WALNUT CASES, EXTRA.

D 2212.**CORRECTIVE GAUGE STANDARDS.****Fig. 3.**

These discs are employed for testing and correcting fixed gauges, for setting calipers, and also as a reference to prove dimensions within their range. Each disc is separate, and is ground independently to size. Any combination of sizes from 1/4 to 6 inches can be furnished.

Standard Corrective Gauge, 49 sizes, 1/4 inch to 2 1/2 inch by 16ths, 2 3/8 inch to 4 inch by 8ths..... \$ 84.00
 Standard Corrective Gauge, 61 sizes, 1/4 inch to 4 inch, inclusive by 16ths 107.00
 " " " 93 sizes, 1/4 inch to 6 inch, inclusive by 16ths 260.00
 WALNUT CASES, EXTRA.

D 2218.

ADJUSTABLE THREAD CUTTING AND MILLING TOOL.

This tool in response from many ers and ma-



was designed to a demand brass finish-
chine shops



Badger
Die
Stock
Always
Cuts
Same
Size.

for an adjustable die or milling tool, which could be easily adjusted, and when adjusted, so firmly clamped into position as to maintain its size and do as good work as a SOLID DIE OR MILL. Numerous attempts in this direction have been made and a great many tools of various designs put on the market, but as is well known among tool-makers, they have all had defects which render them useless for ordinary work, the principal defect having been that the method of adjustment was TOO DELICATE TO INSURE STABILITY, and that the slightest AMOUNT OF WEAR IN ANY OF THE MANY MOVING PARTS would render the tool worthless.

The tool herewith illustrated is not open to any of these objections. The parts are few and simple, THE ADJUSTMENT POSITIVE; the cutters are SOLIDLY BACKED UP AGAINST the nut, and firmly CLAMPED INTO POSITION BY THE CAP. THE CUTTERS MAY BE REMOVED INSTANTLY, for grinding, or may be exchanged for a set of dies, which can be used in the same holder. The adjustment can be made from ONE SIZE TO ANOTHER in less time than it would take to change the TOOLS, IF THEY WERE SOLID. While its first cost is SOMEWHAT GREATER THAN A SINGLE HOLLOW MILL OR DIE, in view of the IMMENSE RANGE OF SIZES COVERED by the tool, and the simplicity and cheapness of its cutters, it is capable of affecting a VERY LARGE SAVING in the cost of such tools to those who do work within the scope of its capabilities. For instance, on a basis of adjustments of 1-64th of an inch, a set of THREE OF THESE ADJUSTABLE mills would represent no less than 96 SOLID MILLING TOOLS, think of it, 96! of the usual type, as such a set will mill or thread from 1-64th to 1½ inches inclusive, and of course may be set to any size whatever within that range. THE ABSOLUTE MAINTENANCE of standard sizes of work turned out is guaranteed by its makers for the McCanna Milling Tool. The BLADES, which are very simple in construction and absolutely free from complication, or any parts liable to break—can be re-ground until they are used up, and in the case of dies can be annealed and re-cut a number of times, or (as will be seen by the prices given) can be replaced with a new set at a trifling cost. When desired a drill and facing-tool may be placed in the shank, and the mill also furnishes an excellent substitute for a chuck to hold twist drills, etc., by simply setting the cutter blades down to grasp the drill. These tools are fully warranted in every respect and each one carefully tested before leaving our hands.

The McCanna Milling Tool is warranted to stand "up to its work" as well, and to CARRY AS HEAVY A CUT as the best types of solid milling tools extant.

DIRECTIONS.—Do not use a hammer or drift to remove the blades. Slack off the cap and the blades will draw out easily. Do not grind the inner edge of the blades, that is, the edge which is parallel with the finished work. Grind the face only.—THIS IS MOST IMPERATIVE. To use a counterbore or facing tool, tighten the necessary leader in the blades. In changing from one size to another, slack the cap slightly, and press the blades back against the adjusting nut, then screw up the nut until the mill cuts the proper size, and then tighten the cap.

We are now making this tool in THREE SIZES given in list below, but are prepared to quote prices for any size that may be desired.

SIZE.	Thread Cut and Mill.	Bore of Stock.	Outside Diameter of Stock.	Length.	Size of Blades.	Price, Complete.	Price of Blades per Set—Soft.	Price of Blades Per Set Finished for Threading &c.
No. 1..	$\frac{1}{8}$ to $\frac{1}{4}$	$\frac{3}{8}$	1 $\frac{1}{4}$	3 $\frac{1}{2}$	$\frac{3}{8}$ x $\frac{7}{16}$	\$12.00	\$0.80	\$1.70
No. 2..	$\frac{1}{4}$ to 1	1 $\frac{1}{8}$	2 $\frac{3}{8}$	4	$\frac{1}{2}$ x $\frac{1}{8}$	14.25	.85	1.75
No. 3..	1 to 1 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{3}{8}$	4 $\frac{1}{4}$	$\frac{3}{4}$ x $\frac{1}{8}$	16.00	.90	1.80

When ordering these mills please state the stock on which they are to be used, steel, iron brass, fiberoid, etc. | Blade Grinder for grinding, each, \$8.00

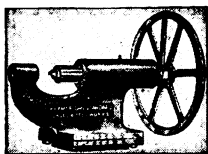


Fig. 2. 6 inch.

D 2219. CALIPERING MACHINE.

Calipering Machines are used to transmit sizes, and differ from fixed Calipers, in that they record as the size is approached, and show how much a piece is to be reduced. Machines of this type are used in connection with standard sizes as an accurate pair of calipers, and have the features of a measuring machine, as they will measure accurately above and below a certain size after having been adjusted, and the index set for a standard size. The machine shown above will caliper to 6 inches. The index wheel is divided to read to ten thousandths of an inch.

Price complete..... \$175.00

NURLS, OR MILLING WHEELS.



Cuts three-fourths size. We can furnish special designs to order at special prices.
Price of any Nurl on this page, each, 50 cents.

D 2230. FANCY NURLS OR MILLING WHEELS.



Special
Taps,
Reamers,
Milling
Cutters,
Made to
Order.

Price, each.....\$0.75

D 2231. UNIVERSAL HANDLES FOR MILLING WHEELS.



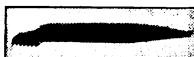
ADJUSTABLE.

Price, each.....\$0.75



**D 2232.
Outside Chaser.**

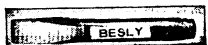
**CHASERS FOR
SCREWS.**



**D 2233.
Inside Chaser.**

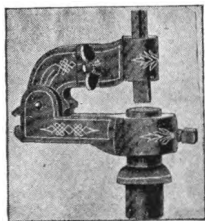
Cutting 5, 6, 7, 8, 9, 10, 11, 11½, 12, 13, 14, 15 and 16 threads to the inch.....	\$0.30	\$0.60
Cutting 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 56, 60, 62, 64, and 70 threads to the inch.....	.25	.50

These Screw Chasers have V threads. Threads not given in above list will be charged at special prices.



D 2234. COLD CHISELS, BEST CAST STEEL.

Size, inches..... ¼	⅜	½	¾	1
Price, each.....\$0.30	\$0.35	\$0.35	\$0.40	\$0.50
			\$0.55	\$0.60

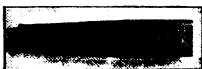


D 2235 COLD CHISEL HOLDER.

This cut represents a very convenient little tool we have just secured for cutting sheet metal in irregular shapes. It is simply an arrangement for holding a cold chisel so that one hand will be at liberty to hold the work; it will also answer for cutting off wire, or small pieces of steel, etc. It is intended to be held in a vise, and will be found a very handy appliance.

The Chisel is made from ½ inch steel.

Price, including one Chisel.....\$1.25



D 2236, 350C.

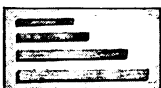
RIVET SETS, CAST STEEL FORGED.

Nos.....	00	0	1	2	3	4	5	6	7	8
Size of holes.....	5-16	9-32	17-64	2	8	14	20	26	32	40
For Belt Rivets No.....	1	2	3	4&5	6&7	8	9	10&12	13	14
Price, per dozen.....	\$9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50
Price, each.....	.90	.85	.80	.75	.70	.65	.60	.55	.50	.45



D 2237. MACHINISTS' SCRATCH AWLS.

Best quality of cast steel, each.....\$0.40



D 2238. MACHINE KEYS.

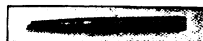
These Keys have a uniform taper, ⅛ inch in 6 inches, are free from hammer marks and scale and require little or no fitting. Special sizes made to order. Price and sample furnished on application.

Inch.	Per 100	Inch.	Per 100	Inch.	Per 100
1- 4x1- 8x2 1-2.....	\$1.25	5-16x1- 4x3.....	\$2.20	3-8x11-32x3.....	\$3.00
1- 4x5-32x2 1-2.....	1.00	5-16x9-32x3.....	2.40	3-8x 3-16x4.....	2.30
1- 4x3-16x2 1-2.....	1.25	3- 8x3-16x3.....	2.00	3-8x 1- 4x4.....	2.90
1- 4x7-32x2 1-2.....	1.40	3- 8x1- 4x3.....	2.50	3-8x 9-32x4.....	3.25
5-16x3-16x3.....	1.80	3- 8x9-32x3.....	2.80	3-8x 5-16x4.....	5.40
5-16x7-32x3.....	2.00	3- 8x5-16x3.....	2.90	3-8x11-32x4.....	3.70

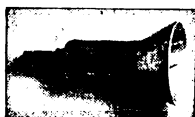


D 2244. Center Punch.
Cast Steel, each....\$0.15

PUNCHES.



D 2245. Solid Round Punch.
Cast Steel, each.....\$0.15



D 2246. BELL CENTERING PUNCH.

Very accurate, finely finished and made of the best material suitable; capacity up to $1\frac{1}{2}$ inches; weight, 5 ounces.

Price.....\$1.00

BOSTON PUNCHES.

Spring Punches.....	4 in.	6 in.	8 in.	10 in.
Hold Tubes.....	1 to M	F to L	E to K	A to D
Price, each.....	\$0.65	\$0.75	\$0.85	\$1.25
Extra Tubes.....	.30	.30	.30	.30



D 2247. Boston Drive Punch.

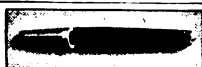
Tubes screw into handles, and are interchangeable.

Price, each....\$1.00 | Extra Tubes, each..\$0.30

A B C D E F G H I K L M N



Showing Sizes of Tubes for Boston Drive and Spring Punch.



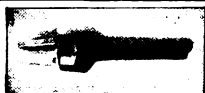
D 2248. ROUND DRIVE PUNCHES.

Cast Steel, No. 28B.

Nos.....	00	0	1 to 6	7 to 9	10 to 12	13 to 16
Price, per dozen.....	\$2.40	\$2.20	\$2.00	\$2.50	\$3.00	\$5.25
Price, each.....	.25	.25	.20	.25	.30	.55

Sizes per Twist Drill Gauge.

Nos.	00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	P'chs.
No.	.52	46	40	35	30	25	20	14	8	2	gauge.	15-64	1-4	9-32	10-64	5-16	11-32	23-64	3-8 Inch.



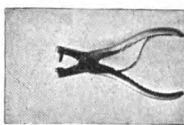
D 2249.

ROUND DRIVE PUNCHES.

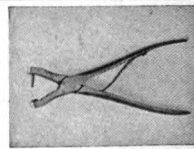
Cast Steel, No. 27A.

Size, in.	7-16	1-2	9-16	5-8	11-16	3-4	13-16	7-8	15-16	1	1 1/8 to 1 1/4	1 3/8 to 1 1/2
Per doz.	\$9.50	10.00	10.50	11.00	11.50	12.00	12.50	13.00	13.50	14.00	25.00	32.00
Each...	.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	2.50	3.20
Size, inches..	15-8	13-4	17-8	2	21-8	21-4	23-8	21-2	23-4	3		
Each.....	\$2.75	3.50	3.75	4.00	4.25	4.75	5.25	6.00	7.50	9.00		

Badger
Die
Stocks
for
Bicycle
Use.



SPRING BELT PUNCHES.

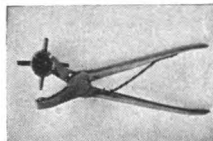


D 2250. 22B.

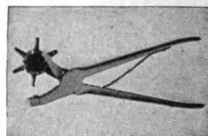
Size, inches.....	5	7	9
Price, per dozen.....	\$4.80	5.75	8.50
Price, each.....	.50	.60	.85
Price, extra tubes, per dozen.....	1.75	1.90	2.10

D 2251. 22B.

Half dozen in box.



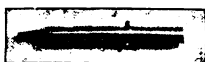
REVOLVING PUNCHES.



D 2252, No. 18B.

No. 18B, per doz., \$18.00; each, \$1.80 | No. 19B, per doz., \$21.00; each, \$2.10
Extra tubes, either number, per doz., \$2.00; each, \$0.20.

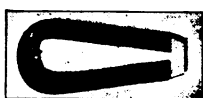
D 2253, No. 19B.



D 2260. POINTED EYE MAGNETS.

For removing small particles of iron and steel from the eye, etc.

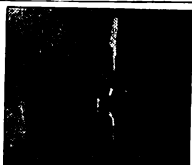
Nickel plated, $3\frac{1}{2}$ inches... each, \$0.30 | Nickel plated, 7 inches.... each, \$0.50



D 2261. HORSE SHOE MAGNETS.

These are English make and very powerful.

Size, inches.....	2	$2\frac{1}{4}$	3	4	5	6	8	10	12
Price, each.....	\$0.25	0.30	0.35	0.50	0.60	0.75	1.50	2.75	3.50



D 2262. WASHER CUTTER.

Small size, cuts 6 inch washer, each..... \$1.00

Large size, cuts 8 inch washer, each..... 1.25



D 2263. ADJUSTABLE PLANER JACK.

No. 1. $1\frac{1}{4}$ inches high; price, each.....\$0.40

No. 2. $2\frac{3}{4}$ inches high; price, each..... .50

No. 3. 4 inches high; price, each..... .75

Per set of three..... 1.50



D 2264. MAGNIFYING GLASSES.

Gardner
Die Stock is
Adjustable.

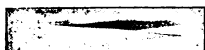
$\frac{1}{4}$ inch, square hole, each.....\$0.50



D 2265. BLOW PIPES.

Size, inches.....	6	7	8	9	10	11	12	14
Plain, each.....	\$0.15	0.15	0.15	0.20	0.25	0.30	0.35	0.40
Ball, each.....	.20	.25	.30	.30	.35	.40	.45	.50

TWEEZERS.



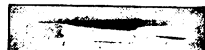
D 2266.

Fine bent point, ea., \$0.75



D 2267.

Skeleton, each, \$0.50



D 2268.

$\frac{3}{4}$ inch, plain, each, \$0.25

D 2269. MACHINISTS' TOOL CHEST, No. 1.



Made of selected lumber, paneled sides, molded top and walnut finish.

DIMENSIONS.

Number 1 contains 2 drawers.

Receptacle under cover, 18 x 10 x $2\frac{1}{2}$ in.

Sliding Tray, $16\frac{3}{4}$ x $5\frac{1}{2}$ x $1\frac{1}{4}$ in.

First Drawer, 17 x $8\frac{3}{4}$ x $1\frac{1}{4}$ in.

Second Drawer, 17 x $8\frac{3}{4}$ x $2\frac{1}{2}$ in.

Price, each.....\$4.50

D 2270. SOLIDIFIED PETROLEUM BOILER COMPOUND



Prevents and removes incrustations. Non-injurious to iron. Is in solid, dry form, entirely soluble, leaves no sediment, will dissolve in cold water. Will prevent matter adhering to the tubes and plates, causing it to settle in bottom of boiler. A scale 1-16 of an inch thick requires 15 per cent. more fuel; $\frac{1}{4}$ of

an inch scale requires 66 per cent. more fuel. By using our goods in your water a working pressure of 90 pounds can be maintained with 326 deg. F. Per lb., 15c.

D 2275.

SPRING COTTER PRICE LIST.

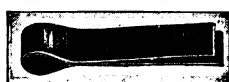


Superseding all previous lists. In effect
April 1, 1896.

PRICE PER THOUSAND.

WIRE GAUGE.....	13	12	11	10	9	8	7	6
DIAMETER.....	$\frac{3}{32}$	$\frac{7}{64}$	$\frac{1}{8}$	$\frac{5}{64}$	$\frac{3}{32}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{2}$
Length $\frac{1}{2}$ inch.....	\$3.75	\$4.25	\$4.75	\$5.00	\$5.50	\$6.00		
Length $\frac{3}{4}$ ".....	4.40	4.90	5.50	5.80	6.50	7.20	\$7.50	\$8.00
Length 1 ".....	5.00	5.50	6.25	6.60	7.50	8.40	8.80	9.50
Length $1\frac{1}{4}$ ".....	5.60	6.10	7.00	7.40	8.50	9.60	10.10	11.00
Length $1\frac{1}{2}$ ".....	6.20	6.70	7.75	8.20	9.50	10.80	11.40	12.50
Length $1\frac{3}{4}$ ".....	6.80	7.30	8.50	9.00	10.50	12.00	12.70	14.00
Length 2 ".....	7.40	7.90	9.25	10.00	11.50	13.20	14.00	15.50
Length $2\frac{1}{4}$ ".....			10.00	11.00	12.50	14.40	15.30	17.00
Length $2\frac{1}{2}$ ".....			10.75	12.00	13.50	15.60	16.80	18.50
Length $2\frac{3}{4}$ ".....							18.30	20.50
Length 3 ".....							19.80	22.50

WIRE GAUGE.....	5	4	1	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	
DIAMETER.....	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{5}{16}$					
Length 1 inch.....	\$12.00	\$15.00	\$20.50					
Length $1\frac{1}{4}$ ".....	13.50	16.50	22.75					
Length $1\frac{1}{2}$ ".....	15.00	18.00	25.00	\$28.50				
Length $1\frac{3}{4}$ ".....	16.50	20.00	27.25	30.75	\$39.00			
Length 2 ".....	18.00	22.00	29.50	33.50	43.50	\$52.50		Special
Length $2\frac{1}{4}$ ".....	19.50	24.00	31.75	36.00	47.25	57.75		Taps.
Length $2\frac{1}{2}$ ".....	21.00	26.25	34.00	38.75	51.00	63.00		Any Size
Length $2\frac{3}{4}$ ".....	23.50	28.00	36.75	40.50	54.75	68.00		Made to
Length 3 ".....	25.00	30.00	39.75	43.25	58.50	73.50	\$112.50	Order.
Length $3\frac{1}{4}$ ".....		32.00	42.75	46.00	62.25	78.75	118.50	
Length $3\frac{1}{2}$ ".....		34.00	45.00	48.75	66.00	84.00	124.50	
Length $3\frac{3}{4}$ ".....		36.50	47.25	51.75	69.75	89.25	130.50	
Length 4 ".....		39.00	49.50	54.75	73.50	94.50	136.50	
Length 5 ".....					88.50	115.50	160.50	
Length 6 ".....						136.00	184.50	



D 2276. FLAT SPRING KEYS.

Superseding all previous lists. In effect
April 1, 1896.

WIDTH.....	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Length $1\frac{1}{4}$ inches.....	\$14.00	\$21.00		
Length $1\frac{1}{2}$ ".....	15.75	22.75		
Length $1\frac{3}{4}$ ".....	17.50	24.50	\$26.25	
Length 2 ".....	19.25	26.25	38.00	\$34.25
Length $2\frac{1}{4}$ ".....	21.00	28.00	30.75	36.75
Length $2\frac{1}{2}$ ".....	22.75	29.75	33.25	39.25
Length $2\frac{3}{4}$ ".....	24.50	31.50	36.00	42.00
Length 3 ".....	26.25	33.25	38.50	44.75
Length $3\frac{1}{4}$ ".....			41.25	47.25
Length $3\frac{1}{2}$ ".....			43.75	50.00

D 2277. STEVENS' UNIVERSAL THREADING TOOL.



Special advantages obtained in using this tool:

1st. The circular shape of the Cutter insures a good backing for the point, thus avoiding the constant snapping off of the cutting part. The tool, being round and always ground on the top of tooth, never alters its shape.

2d. The head, being held to the body by the tennant or round pin, whereby it may be swiveled to any desired position, allowing it to always lay with the lead of the screw being cut, thereby avoiding any drag to the heel, as is so common in the other tools of this description.

3d. The Cutters are made with a taper shank, which by means of binding screw are drawn into the holder, thus keeping the Cutter from turning when under pressure.

It must always be set on the center, and will cut either right or left-hand threads, V or square, or in fact any form desired. To this holder may also be attached chasers, or forming tools. Always grind on the face of the tool. The holders are all ground true and square before hardening, there being no finishing afterward. All screws are hardened and all parts are interchangeable. The V thread tools are all ground to an angle of 60 degrees after hardening. This one tool will do the work which it has required before three tools to do at a cost of \$7.00.

Price.....\$3.50 | Extra Cutters.....\$1.00

D 2284.

LATHE TOOLS.



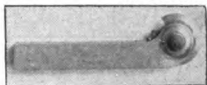
Gardner
Die Head
Cuts
Accurate
Threads.

1, Left side tool; 2, right side tool; 3, left side tool, bent; 4, right side tool, bent; 5, heavy diamond point for cast iron; 6, diamond point for steel and wrought iron, right hand; 7, diamond point for steel and wrought iron, left hand; 8, half diamond point; 9, round nose; 10, water finishing tool; 11, cutting-off tool; 12, roughing tool; 13, thread tool; 14, bent thread tool; 15, inside turning tool; 16, inside thread tool.

Made from steel; size, inches. $\frac{1}{4} \times \frac{1}{2}$ 5-16 $\times \frac{3}{8}$ $\frac{3}{4} \times \frac{1}{2}$ $\frac{1}{2} \times 1$ $\frac{1}{2} \times 1\frac{1}{4}$ $\frac{5}{8} \times 1\frac{1}{4}$
Price, each.....\$0.30 \$0.35 \$0.40 \$0.60 \$0.80 \$1.00

D 2285.

MORSE LATHE THREADING TOOL.



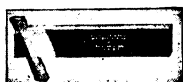
The Holder of this Tool is slotted, forming jaws, between which the Circular Cutter is firmly held by a bolt passing through the jaws and the Cutter. The Cutters are furnished to the V or

U. S. Standard thread, singly or in sets, as desired. They are readily removed from the Holder. The roughing cut for a thread may be taken with one section of the Cutter and the finishing cut with another, the Cutter being revolved in the Holder, which need not be removed from the tool-post of the lathe. The Cutters are quickly sharpened by grinding the faces.

Price, complete....\$2.20 | Price of Holder.....\$1.00 | Price of Cutter....\$1.20

D 2286.

BEACH'S IMPROVED PATENT THREAD CUTTING AND DIAMOND POINT LATHE TOOL.



No. 2.



No. 3.

These Tools have now been in constant use for the past ten years. Many of them are in the hands of our best mechanics, and have been pronounced to be all that could be desired for thread cutting and for turning. The Cutters are made from the best steel carefully tempered, and are exact to United States Standard Gauge, viz.: 60 degrees. One of these Cutters will do more than six times the work of any forged tool, and when used up can be replaced for 25 cents, which is not more than the cost of one dressing by the blacksmith. No time is spent in forging, and very little in grinding. As a matter of economy only, no one who uses an Engine

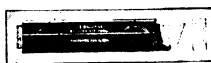
Lathe can afford to be without one of these tools.

	Size of Holder, Inches.	Thickness of Cutter.	Straight or Bent Holder.	Extra or Dup- licate Cutters.
No. 2 Tool, with two Cutters, fine or V adjustment, }	15-16x1-2x5 7-8	3-16	\$2.50	\$0.25
No. 3 Tool, with two Cutters, fine or V adjustment. }	1 1-16x17-32x5 7-8	1-4	3.00	.35

Clamps and Nuts, 30 cents each. Cutters for U. S. Standard threads will be furnished at an advance of 5 cents each on above prices.

In ordering U. S. Standard Cutters state number of threads wanted to the inch.

D 2287. C. E. BILLINGS' PATENT CUTTING-OFF TOOL.



This improved Cutting-off Tool Holder is made with two separable segments, provided with two screws for clamping the segments together for the purpose of holding the Cutter fast when

grinding. The force of the screw of the Tool Post not only retains the Holder in proper position, but also holds the Cutter with all the necessary additional firmness. The Holder is drop-forged of open hearth 40 carbon steel, finished in a thorough manner and case-hardened. The Cutters are made of the best tool steel.

Price of Holder, with one Blade..\$2.50	Extra Blades, 5-32 thick...each, \$0.35
Extra Blades, 1-16 thick.....each, .30	" " 3-16 " .. " .40
" " 3-32 " " .30	" " 7-32 " .. " .45
" " 1-8 " " .30	" " 1-4 " .. " .50

**D 2293. SLATE'S CUTTING-OFF TOOL.**

The advantages of this Tool are: The Cutters are made from the best *hammered* tool steel, and vary in thickness by 100ths, from 6-100 to 14-100, and are held in a holder. They are also less liable to break than ordinary cutting-off tools, inasmuch as they are hardened only on the upper or cutting edge.

Holder, with one Blade.....	\$2.50	Extra Blades, 1-8.....	\$0.30
Extra Blades, 1-16.....each,	.30	" " 5-32.....	.35
" " 3-32.....	.30	" " 3-16.....	.50

D 2294. SLATE'S DIAMOND POINT HOLDER, No. 1.

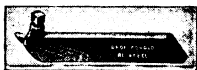
This cut represents a useful tool. The shank of holder is $1\frac{1}{4} \times \frac{1}{2}$ inch. These tools are cheap, are drop-forged from best tool steel, are convenient and can be kept in stock in tool room and given out, saving time of forging and time of waiting in many cases. The cost of a Diamond Point is less than the tool steel in the rough.

These tools are guaranteed to please. Don't think because you run a big shop you can forge cheaper. Some of our largest concerns, on light work, order these tools by the gross.

Holder and Diamond Point.....	\$1.00	Diamond Points, each.....	\$0.20
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D 2295. THE ARMSTRONG TOOL HOLDER

For General Lathe and Planer Work.



ITS POINTS OF MERIT: Forging and tempering are entirely dispensed with. Grinding is reduced to a minimum. The points can be ground to any desired shape or clearance. It is of a handy length and the point always keeps at the same height. It will work either right or left hand, and as there are no side projections it can be used close into a corner. The rake of the cutter is such that it takes a clean curling chip from wrought iron or steel, no top grinding being necessary. There is absolutely no slip to the cutter; it is supported directly under the strain of the cut, and will do as heavy work as any forged tool of same size. It is simple and durable, and will stand the racket of constant use for many years. One pound of tool steel used in this holder equals ten pounds in the ordinary tool.

Parallel
Clamps
Hold
Work
True.

No.	Size of Holder, Inches.	Size of Cutter.	Price, Complete	By Mail— Extra.	Extra Cutters.
0	3-8 x 3-4 x 5	3-16 in. square.	\$1.65	15c.	12c. each
1	1-2 x 1 x 6	1-4 " "	1.80	20c.	15c. "
2	5-8 x 1 1-4 x 7	5-16 " "	2.30	35c.	22c. "
3	3-4 x 1 3-8 x 8	3-8 " "	3.00	55c.	30c. "
4	7-8 x 1 1-2 x 9	7-16 " "	3.80	Express.	40c. "
5	1 x 1 5-8 x 10	1-2 " "	4.75	"	50c. "
6	1 1-4 x 1 7-8 x 12	5-8 " "	7.00	"	75c. "

**D 2296. THE ARMSTRONG BORING TOOL.**

A practical all-around Boring and Threading Tool. Especially adapted for the economical use of self-hardening steel.

STRICTLY NET PRICE LIST.

No.	Size of Shank Inch.	Size of Bar, Inch.	Size of Cut'r, Inch.	Price, Complete.	Extra Cutters Ground for Boring.
8	3-8x 3-4	9-16 Round.	3-16 Square.	\$3.00	\$0.12 each.
9	1-2x1	3-4 " "	1-4 " "	3.60	.15 "
10	5-8x1 1-4	15-16 " "	5-16 " "	4.75	.20 "
11	3-4x1 1-2	1 1-8 " "	3-8 " "	6.75	.30 "

Extra warranted self-hardening steel in 3 ft. lengths, 1-4 in. square, 60c. per length. Enough to make 2 dozen extra cutters, 5-16 in. square, 85c per length.

D 2297. HELMET BRONZE LETTER OPENER.

Actual length of opener, eight inches. This Letter Opener shows the elasticity of *Helmet Spring Bronze*. Letter Opener mailed on receipt of 16 cts. in stamps.

D 2305. THE ARMSTRONG OFF-SET TOOL HOLDERS.



For general lathe and planer work. Especially adapted for the economical use of self-hardening steel.

In response to the general demand from our customers for an Off-set Tool Holder, we now place upon the market the one herewith illustrated and described, feeling confident it will fill the bill. To the trade who are now using the 50,000 Tool Holders that we have sold during the five years they have been on the market, it is only necessary to state that in these Holders we have maintained the same grade of workmanship and material which has given such uniform

RIGHT satisfaction in our regular straight Tool Holders. The **LEFT** holder is a solid steel forging. The set screw is made of

tool steel with tempered point. The slot for receiving the cutter is drilled and squared from the solid. The cutters are made of fine self-hardening steel.



NET PRICE LIST OF OFF-SET TOOLS.

Complete with Drop-Forged Wrench and two Self-Hardening Steel Cutters, ground to shape.

No. Right or Left.	Size of Holder.	Size of Cutter.	Price Complete.	Extra Cutters.	
1	$\frac{1}{8}$ x 1 x 8 in.	1- 4 in. square.	\$ 1.80	\$0.15 each.	
2	$\frac{3}{8}$ x 1 $\frac{1}{4}$ x 9 "	5-16 " "	2.30	.22 "	
3	$\frac{3}{4}$ x 1 $\frac{3}{8}$ x 10 "	3- 8 " "	3.00	.30 "	Gardner
4	$\frac{7}{8}$ x 1 $\frac{1}{2}$ x 11 "	7-16 " "	3.80	.40 "	Grinder
5	1 x 1 $\frac{1}{8}$ x 12 $\frac{1}{2}$ "	1- 2 " "	4.75	.50 "	for Flat
6	1 $\frac{1}{4}$ x 1 $\frac{1}{8}$ x 15 "	5- 8 " "	7.00	.75 "	Grinding.
7	1 $\frac{1}{2}$ x 2 $\frac{1}{4}$ x 20 "	3- 4 " "	12.00	1.50 "	

NOTICE—In ordering always specify whether Right or Left is wanted. We will always send straight shank as listed on page 206 if Right or Left is not mentioned.

D 2306. THE ARMSTRONG TOOL HOLDER No. AO.



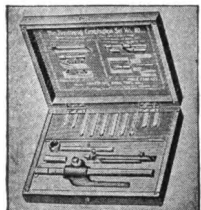
This set consists of a Holder $\frac{3}{8}$ x $\frac{1}{4}$ x 5 inches with Wrench and 9 Cutters, in a polished hardwood case. Holder is drop-forged of steel and case-hardened. Set Screw is made of tool steel with tempered point.

Cutters are made of fine self-hardening steel, and can be ground quickly to any desired shape or clearance on a dry wheel without injury.

The rake of the cutter is such that it takes a clean curling chip from wrought iron or steel; no top grinding being necessary. Saves time and trouble of forging, dressing and tempering tools. 70 per cent. grinding, and 90 per cent. tool steel. One set will take the place of half a dozen forged tools.

A practical substitute for forged tools. For general use on lathes and shapers. Especially adapted for Electricians, Model Makers, Bicycle Makers and Amateur Machinists.

Price, net.....\$3.00 | By mail.....\$3.25



D 2307. ARMSTRONG COMBINATION SET, No. 80.

This set comprises one No. 8 Boring Tool with wrench and six cutters; one No. 0 Lathe and Shaper Tool with wrench and six cutters; one piece special Self-Hardening Steel 9 inches long. Put up in hardwood polished case.

Price, net.....\$7.00

NET PRICE LIST.

Extra warranted Self-Hardening Steel for use in Armstrong Tool Holders. Furnished in 3 feet lengths only.

Length.	Size.	Price.	Length.	Size.	Price.
3 feet.	3-16 inch square.	\$0.50	3 feet.	7-16 inch square.	\$1.50
3 "	1- 4 " "	.60	3 "	1- 2 " "	1.85
3 "	5-16 " "	.85	3 "	5- 8 " "	2.85
3 "	3 8 " "	1.20	3 "	3- 4 " "	4.75

PRICE.

PATTERN LETTERS AND FIGURES.

D 2313.

	ROMAN
1/8 IN	
2¢ EA	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A. 1 2 3 4 5 6
3/16 IN	
2¢ EA	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z.
1/4 IN	
2¢ EA	G A R D N E R D I E S T O O K 1 2 3 4 5 6
5/16 IN	
2¢ EA	P E R F E C T I O N O I L C U P S
3/8 IN	
2 1/2¢ EA	A B C D E F G H I J K L M N O
1/2 IN	
2 1/2¢ EA	P Q R S T U V W X Y Z &
9/16 IN	
3¢ EA	A 1 B 2 C 4 D 5 F 6 G 7
5/8 IN	
3¢ EA	B O N A N Z A C U P S
3/4 IN	
3 1/2¢ EA	H E L M E T O I L
7/8 IN	
4¢ EA	A B C D E F G H
1 IN	
4 1/2¢ EA	I J K L M N O
1 1/4 IN	
6¢ EA	P Q R S T U
1 1/2 IN	
7 1/2¢ EA	V W X 1 2 3
	Y Z & ' 4.
2 IN	
9¢ EA	
	BRAND
1/4 IN	
3¢ EA	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
3/8 IN	
3¢ EA	S T U V W X Y Z A. 1 2 3 4
1/2 IN	
4¢ EA	A 1 B 2 C 3 D 4 E 5 F 6 G
5/8 IN	
5¢ EA	H I J K L M N O P Q R
3/4 IN	
6¢ EA	S T U V W X Y Z &

PRICE.

PATTERN LETTERS AND FIGURES.

D 2319.

SHARP FACE GOTHIC

1/8 IN 2c EA A B C D E F G H I J K L M N O P Q R S T U V W X Y Z & 1 2 3 4 5

3/16 IN 2c EA A B C D E F G H I J K L M N O P Q R S T U V W X Y Z & 1 2 3 4 5

1/4 IN 2c EA HELMET OIL THE CHEAPEST TRY IT

5/16 IN 2c EA HELMET BRONZE FOR SPRINGS

3/8 IN 2 1/2 EA A 1 B 2 C 3 D 4 E 5 F 6 G 7 H 8 I 9 J

1/2 IN 2 1/2 EA A B C D E F G H I J K L M N O

5/8 IN 3c EA P Q R S T U V W X Y Z &

3/4 IN 3 1/2 EA A C D E G H I J &

1 IN 5c EA

1 1/4 IN 7c EA

FLAT FACE GOTHIC

1/4 IN 2c EA A B C D E F G H I J K L M N O P Q R S T U V W

1/2 IN 2 1/2 EA A 1 B 2 C 3 D 4 E 5 F 6 G 7 H 8 I 9 J O

3/4 IN 3 1/2 EA K L M N O & 1 2 3 4 5

HAIR LINE

3/16 IN 2c EA A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &

1/4 IN 2c EA METAL WORKERS FINE TOOLS 1 2 3 4 5

5/16 IN 2c EA A 1 B 2 C 3 D 4 E 5 F 6 G 7 H 8 I 9 J O

3/8 IN 2 1/2 EA K L M N O P Q R S T U V W X Y Z &

FANCY

1/2 IN 4c EA A B C D E F G H I J K L M N

3/4 IN 5c EA O 1 P 2 Q 3 R 4 S 5 T

1 IN 6c EA H I J K N U V & 6

1 1/2 IN NUMBERING PLATES 1 TO 3 NUMBERS 12c EACH
NICKLE PLATED 20c

1 1/2 IN 50c SPECIAL 1 1/2 IN 2c SPECIAL FIGURE

PATTERN LETTERS AND FIGURES.

Additional sizes of the preceding styles not listed heretofore.

D 2319.**ROMAN.**

Size, inches.....	1¾	2½	3	4	5	6
Price, each.....	\$0.09	.14	.16	.30	.35	.40

Sizes 5 and 6 inch made in figures only.

D 2320.**BRANDING IRON.**

Size, inches.....	1	1½	1¾
Price, each.....	\$0.07	.08	.10

D 2321.**FLAT FACE GOTHIC.**

Size, inches.....	3-16	3-8	5-8	7-8	1
Price, each.....	\$0.02	.02½	.03	.03	.04½

D 2322.**HAIR LINE GOTHIC.**

Size, inches.....	3-32	1-8	7-16	1-2	9-16	5-8
Price, each.....	\$0.03	.02	.02½	.02½	.03	.03

D 2323.**FANCY ANTIQUE.**

Size, inches.....	¾	¾	¾	1¾
Price, each.....	\$0.03	.04	.05	.07

Sizes and styles special pattern letters and figures not illustrated made only to order.

D 2324.**FIGURES,**

With tacks cast in each for fastening.

Size, inches.....	1	1½	1¾	2
Price, each.....	\$0.08	.10	.12	.15

Bonanza
Oil Cups
are Good

D 2325.**ROUND FACE GOTHIC.**

Size, inches.....	¼	¾	½	¾	1	1¾
Price, each.....	\$0.02	.02½	.02½	.03	.03½	.07

D 2326.**CONDENSED THIN ROMAN.**

Size, inches.....	¾	½	¾	¾	1½	2½
Price, each.....	\$0.2½	.02½	.03	.04	.07½	.14

D 2327.**OVAL FACE.**

Size, inches.....	1½	1¾	2½
Price, each.....	\$0.07½	.14	.14

D 2328.**SKELETON SHARPE GOTHIC.**

Size, inches.....	1½	Price, each.....	\$0.07½
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D 2329.**LIGHT FACE GOTHIC.—Double Thickness.**

Size, inches.....	1½	Price, each.....	\$0.08
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D 2330. GOTHIC BRANDING IRON PATTERN, Extra Deep (Reversed).

Size, inches.....	1-8	3-16	1-4	3-8	1-2	5-8	3-4	1	1½
Price, each.....	\$0.05	.05	.05	.05	.05	.06	.07	.07	.08

D 2331.**CONDENSED ROMAN BRANDING PATTERN, Extra Deep (Reversed).**

Size, inches.....	5/8	¾	1	1¾
Price, each.....	\$0.06	.07	.06	.08

D 2332.**EXTRA CONDENSED GOTHIC BRAND.**

Size, inches.....	¾	Price, each.....	\$0.07
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D 2333.**FLAT FACE GOTHIC.—Treble Thickness.**

Size, inches.....	3-8	1-2	5-8	3-4	1	1½	2	3
Price, each.....	\$0.04	.05	.06	.07	.08	.09	.12	.25

3-inch heavy deep block.

D 2334.**FLATTENED FACE SHARP GOTHIC.**

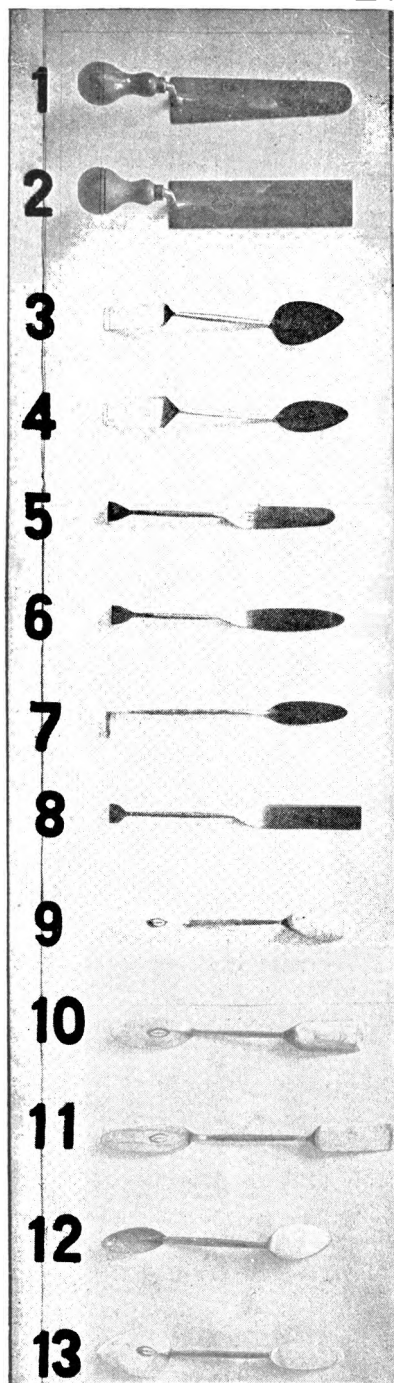
Size inches.....	3-16	1-4	5-16	3-8	1-2	5-8	3-4	1	11-4	13-8	11-2	2	3
Price, each.....	\$0.02	.02	.02	.02½	.02½	.03	.03½	.05	.06	.07	.08	.10	.15

D 2335.**DORIC.**

Size, inches.....	3-16	5-16	3-8	1-2	3-4	1
Price, each.....	\$0.02	.02	.02½	.02½	.03½	.05

D 2336.**CAR WHEEL GOTHIC.**

Size, inches.....	1½	1¾
Price, each.....	\$0.07	.07½



D 2354.

MOULDERS' TOOLS.

No. 1. FINISHING TROWEL.

Length, in.	5	5½	6	6½
1 in. wide	\$0.65	.70	.75	.80
1½ " "	.75	.80	.85	.90
1¾ " "	.85	.90	.95	1.00

No. 2. SQUARE TROWELS.

Length, in.	4	4½	5	5½	6
1 in. wide	\$0.45	.50	.55	.60	.65
1½ " "	.60	.65	.70	.75	.80
1¾ " "	.65	.70	.80	.85	.90
2 " "	.80	.85	.90	1.00	1.05
2 " "	1.00	1.15	1.25		

No. 3. HEART AND SQUARE.

Heart, in. wide	1	1½	1¾	2
Price, each	\$.50	.60	.65	.75

No. 4. TAPER ROUND POINT.

Width, in.	¾	¾	1	1½	1¾
Price, each	\$.40	.50	.60	.65	.75

We also make the 1 inch Slicks with one end straight, ¾ wide. These slicks are the finest and most convenient tool in use.

No. 4. DOUBLE SQUARE SLICK

Width, inches	¾	1	1½
Price, each	\$.50	.60	.65

We make one end ¼ in. less in width than the larger end.

BENCH TOOLS.

No. 5. 3-4 BENT BENCH LIFTER.

Price, each, same as No. 8.

No. 6. 3-4 STRAIGHT BENCH LIFTER.

Price, each, same as No. 8.

No. 7. This cut represents a Slick with a heel on one end ½ wide and ¾ inch long. Slick Blade ¾ inch wide and 2¾ inches long.

Price, each\$0.60

No. 8. YANKEE BENCH LIFTER—Square End.

Blade, in. wide	3-16	¼	7-16
Price, each	\$.20	.25	.35

Blade, in. wide	½	¾	1
Price, each	\$.50	.55	.65

No. 9. OVAL SPOON SLICK.

Slick, 1¾; Spoon, 1¾; each	\$0.75
" " " "	.65

No. 10. SLICK.

One end of this tool is an oval-faced blade 1 inch in width and 2½ inches long; the other end is an ordinary slick blade 1 inch wide. Price, each\$0.65

No. 11. SLICK.

Blades, 3x¾. Price, each...\$0.60

No. 12. DOUBLE SPOON.

Size of spoons: One end, 1¾ in. wide, the other, ¾ inch.

Price, each.....\$0.60

No. 13. DOUBLE HEART.

Or "double-enders." It has a heart on one end and a slick blade on the other.

Heart, in. wide	1	1½	1¾	2
Price, each	\$.50	.60	.65	.75

D 2355.

HEART TROWELS.

Width, inches..	2	2¼	2½	3
Price, each	\$.60	\$.75	\$.90	\$1.20

D 2359.

MOULDERS' TOOLS.

No. 14. SPOON AND BEAD.

No. 1, Spoon $\frac{1}{2}$, Bead $\frac{1}{4}$, ea.,	\$0.35
" 2, " $\frac{3}{8}$, " $\frac{3}{8}$, "	.40
" 3, " $\frac{1}{2}$, " $\frac{3}{8}$, "	.45

No. 15. HEART STOVE SLICK.

No. 1, Heart $\frac{3}{4}$ inch....each,	\$0.35
" 2, " $\frac{5}{8}$ " "	.35

No. 16. SMALL SPOON SLICKS.

No. 3, Slick $\frac{3}{4}$, Spoon $\frac{5}{8}$, ea.,	\$0.45
" 4, " $\frac{3}{8}$, " $\frac{1}{2}$, "	.30

No. 17. STOVE SLICKS.

CURVED END.

No. 1, Large Blade, $\frac{3}{4}$ x $2\frac{1}{4}$, ea.	\$0.40
" 2, " $\frac{5}{8}$ x $1\frac{3}{4}$, "	.35

STRAIGHT END.

No. 3, Large Blade, $\frac{5}{8}$ x $1\frac{3}{4}$, ea.	.35
" 4, " $\frac{3}{4}$ x $2\frac{1}{4}$, "	.40

No. 18. DOUBLE BEAD.

12 in. long, one end $\frac{3}{4}$, other $\frac{3}{8}$	\$0.50
8 " " $\frac{5}{8}$, " $\frac{3}{8}$	.40
6 $\frac{1}{2}$ " " $\frac{3}{8}$, " $\frac{1}{4}$	.35

No. 19. SLICK AND BEAD.

This tool has a Slick Blade $1\frac{1}{2}$ inches wide on one end, with a Bead $\frac{3}{4}$ inch wide on the other. Price, each\$0.65

No. 20. FLUTED HUB TOOL.

Sizes, $\frac{3}{4}$ x7 $\frac{3}{4}$ x10 $\frac{3}{4}$ x12 $\frac{3}{4}$ x14 1x16	
Each, \$0.60 .65 .75 .85 1.00	

No. 21. FLANGE LIFTER.

Sizes.....	$\frac{1}{2}$ x14	$\frac{1}{2}$ x16	$\frac{3}{4}$ x14
Price, each...	\$0.90	1.00	1.20

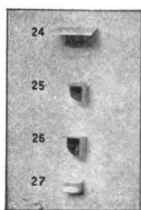
Sizes.....	$\frac{3}{4}$ x16	$\frac{3}{4}$ x18	1x20
Price, each....	\$1.25	1.40	1.50

No. 22. FLANGE AND BEAD.

Width, inches....	$\frac{1}{2}$	$\frac{3}{4}$	1
Price, each.....	\$0.90	1 00	1.40

No. 23. LIFTERS.

Lgth., in.	10	12	14	16	18	20
$\frac{1}{8}$, each	\$0.35	.40	.50	...	...	...
$\frac{1}{4}$, "	.40	.45	.50	.60	...	...
$\frac{3}{8}$, "	.45	.50	.60	.65	...	...
$\frac{1}{2}$, "	.50	.60	.65	.70	.80	...
$\frac{5}{8}$, "	.60	.65	.70	.75	.85	...
$\frac{3}{4}$, "	...	.70	.75	.80	.90	1.00
$\frac{7}{8}$, "	...	...	.80	.85	.95	1.10
1, "	...	...	.85	.90	1.00	1.15

D 2360.**MOULDERS' TOOLS.****No. 24. PIPE SLICKS.**

All Pipe Slicks, each.....\$0.50
In ordering, state circle, width, and length. We also make them oval and egg-shaped.

No. 25. HALF ROUND CORNER SLICKS.

Width, inches..... $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$
Price, each.....\$0.50 \$0.60 \$0.70 \$0.80

No. 26. SQUARE CORNER SLICKS.

Width, inches..... $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$
Price, each.....\$0.50 \$0.60 \$0.65 \$0.70

No. 27. FILLET TOOL.

This Fillet is made in any size up to $1\frac{1}{2}$ inches. Price, each.....\$0.50

**PERFECT LEATHER AND WOOD
FILLETS.**

**D 2361.****D 2361. LEATHER FILLETS.**

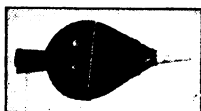
Sizes(in inches) 1-16	1-8	3-16	1-4	5-16	3-8	1-2	5-8	3-4	7-8	1
Width of face.. 3-32	3-16	5-16	3-8	1-2	9-16	3-4	31-32	15-32	13-8	19-16
Price, per 100 ft.\$0.55	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	5.00

D 2362. WOOD FILLETS (in card board tubes.)

Number.....	4	6	8	10	12	14	16	20	24
Size.....	1-4	3-8	1-2	5-8	3-4	7-8	1	11-4	11-2
Price, per 100 ft.....	\$0.60	.65	.70	.75	.85	.95	1.05	2.00	2.40

Apply leather with glue of shellac. No nailing or clamping necessary. Accurately cut to feather edge. ORDER BY NUMBER.

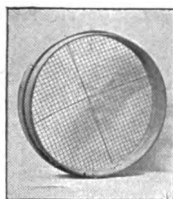
NOTE.—Every foot of our fillet may be returned at our expense (both ways), if not found strictly first-class.

D 2363.**MOULDERS' BELLOWES.**

Size, inches.....	6	7	8	9
Price, per doz.....	\$10.00	\$11.00	\$12.00	\$13.00
Price, each.....	1.00	1.10	1.20	1.30
Size, inches.....	10	11	12	14
Price, per doz.....	\$15.00	\$16.50	\$18.00	\$24.00
Price, each.....	1.50	1.65	1.80	2.40

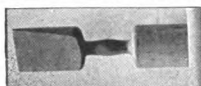
D 2364. MOULDERS' RIDDLES.

18 inches in Diameter.



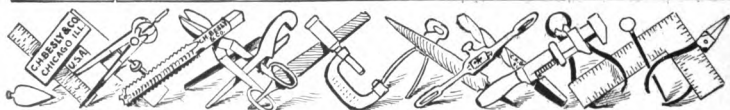
Number of mesh to inch.	2	3	4	6
Brass, per doz	\$18.00	\$18.00	\$18.00	\$18.00
Brass, each	1.80	1.80	1.80	1.80
Galvanized Iron, per doz.	12.00	12.00	12.00	12.00
Galvanized Iron, each	1.20	1.20	1.20	1.20
Iron, per doz.....	10.00	10.00	10.00	10.00
Iron, each	1.00	1.00	1.00	1.00

Number of mesh to inch.....	8	10	12	14	16	18
Brass, per doz.....	\$18.00	\$18.00	\$18.00	\$24.00	\$24.00	\$24.00
Brass, each	1.80	1.80	1.80	2.40	2.40	2.40
Galvanized Iron, per doz.....	12.00	12.00	12.00	.....	.....	.....
Galvanized Iron, each	1.20	1.20	1.20	.....	.....	.....
Iron, per doz.....	10.00	10.00	10.00	.....	.....	.....
Iron, each	1.00	1.00	1.00	.....	.....	.....

**D 2365.****BENCH RAMMERS.**

Per pair.....\$0.50

Exact
Threads.



FORGES.



D 2372.

Forge with Back.



D 2373.

Forge with Hood.



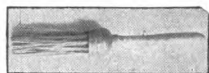
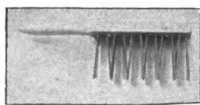
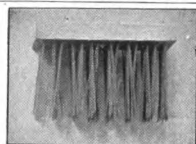
D 2374.

Forge with Closed Hood.

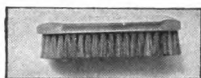
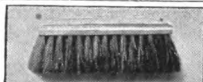
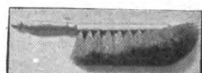
Malleable
Thumb
Screws
Carried in
Stock.

Number.....	D 2372.	D 2373.	D 2374.
Fire Pan, diameter, inches.....	22	22	22
Height of Forge, inches.....	33	33	33
Weight of Forge, pounds.....	125	125	125
Price, each.....	\$40.00	\$43.00	\$46.00

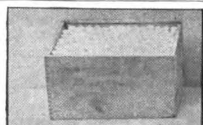
BRUSHES.

D 2375. Round Steel
Casting Brush, Handled.D 2376. Square Steel
Casting Brush, Handled.D 2377. Square Steel
Casting Brush.

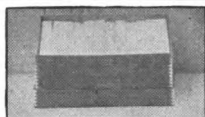
Style	D 2375.	D 2376.	D 2377.
Price, per dozen.....	\$7.50	7.50	6.00
Price, each.....	.75	.75	.60

D 2378. Moulders' Hard
Brush.D 2379. Moulders' Soft
Brush.D 2380. Moulders' Soft
Brush, Handled.

Style.....	D 2378.	D 2379.	D 2380.	Can furnish Handled, Soft or Counter Brushes, No. 2, \$10.50 per dozen; \$1.00 each.
Price, per dozen..	\$4.50	6.75	9.00	
Price, each.....	.45	.70	.90	

D 2381. Common School
Crayon.

D 2381. 1 gross in box, per box..\$0.25

D 2382. Metal Workers'
Crayon.D 2382. 1 gross in box..... \$2.50
D 2383. Per dozen.....\$0.25

CRAYONS.

D 2383. RUBBER TIPPED FOUNDRY RAMMERS.

For Floor or Bench.



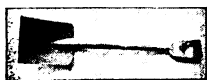
The Foundry Rammer, shown in the cut, has advantages over the rammer usually employed in foundries, in that it does not mar the pattern, whether it be of wood or metal, and with it the mould can be made as hard as with the ordinary rammers. The Rubber Tip is held in an iron holder by two pins, and can be replaced by a new tip at a small expense and with little trouble when it becomes worn. These Rammers are made in two sizes.

The Rubber Tipped Foundry Rammer for Floor, shown in the cut above is 3 inches wide, 7 3-8 inches long, and holds a tip 3 inches wide, 11-16 inch thick and 3-4 inch high. It is provided with a wooden handle and an iron butt. The handles are furnished in two lengths, 47 inches or 58 inches over all.

The Rubber Tipped Foundry Rammer for Bench is similar to the above, differing only in size and in the length of the ferrule. It is 2 inches wide, 2 3-4 inches long, and holds a tip 2 3-16 inches wide, 11-16 inch thick and 3-4 inch high. It is provided with a handle made of 5-8 inch round iron, screwed into the holder, the length over all being 35 1-4 inches.

Price Rubber Tipped Foundry Rammer for Floor, complete, each, \$0.85; Rubber Tips, each, \$0.15, in lots of not less than one dozen, \$1.50 per dozen.

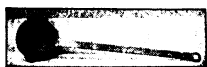
Rubber Tipped Foundry Rammers for Bench, complete, each, \$0.70; Rubber Tips, \$0.12 each, in lots of not less than one dozen, \$1.20 per dozen.



D 2389.

MOULDERS' SHOVELS.

Common, per doz.....	\$ 9.50	Each.....	\$0.95
Ames' No. 2.....	12.50	Each.....	1.25



D 2390

WROUGHT IRON MELTING LADLES.

Size, inches	2½	3	3½	4	5	6	6	7	8	10
Price, each..	\$0.30	.35	.45	.50	.70	.85	1.00	1.20	1.50	2.40
Style.....	Light.					Extra heavy.				



D 2391. STEEL "TOTE" SHOP BOXES.

Sizes Carried in Stock.

No. 2.	18 inches long,	10 inches wide,	5 inches deep,	18 gauge.	Price, each.....	\$0.85
No. 4.	21 inches long,	10 inches wide,	5 inches deep,	18 gauge.	Price, ea.	.95
No. 6.	20 " "	10 " "	5 " "	16 " "	" "	1.05

SPECIAL SIZES TO ORDER.

We carry in stock sheets for the following special sizes, they being the ones we have the most call for, and owing to their proportions make a very strong Box:

strong Box:							18 gauge	16 gauge
14½ inches long,	10 inches wide,	7 inches deep.	Each	.....	\$1.00		\$1.12	
16 "	12 "	6 "	"	.....	1.08		1.20	
18 "	14 "	8 "	"	.....	1.36		1.54	
16 "	12 "	9 "	"	.....	1.36		1.54	
18 "	12 "	8 "	"	.....	1.32		1.50	

Always specify gauge of metal in ordering.



D 2392.

TAPER BOXES.

Sizes Carried in Stock.

No. 20. Top 19 $\frac{1}{4}$ inches long, 11 $\frac{1}{2}$ inches wide. Bottom 16 inches long, 8 inches wide and 6 inches deep, made of 18 gauge steel. Price, each..... \$1.05

No. 22. Top 21 $\frac{1}{4}$ inches long, 11 $\frac{1}{2}$ inches wide. Bottom 18 inches long, 8 inches wide and 6 inches deep, made of 16 gauge steel. Price, ea.. 1.20

SPECIAL SIZES TO ORDER.

SPECIAL SIZES TO ORDER.



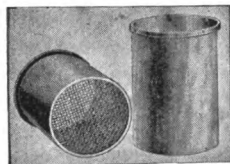
D 2393.

BENCH BOXES.

**Malleable
Thumb Nuts
Carried in
Stock.**

Sizes Carried in Stock.


No. 27.	7¾ inches long, 4⅞ inches wide, 2½ inches deep, 20 gauge.	
Per dozen.....		\$ 4.00
No. 28.	10 inches long, 6 inches wide, 4 inches deep, 20 gauge.	
dozen, \$5.50. Per hundred.....		42.00



D 2394.

STEEL "TOTE" KEGS.

Sizes Carried in Stock.

	No. 30.	15 inches high, 12 inches diameter, wood bottom. Each.....	\$1.70
	No. 31.	18 inches high, 12 inches diameter, wood bottom. Each.....	2.00
	No. 32.	15 inches high, 12 inches diameter, woven wire bottom. Each.....	2.70
	No. 33.	18 inches high, 12 inches diameter, woven wire bottom. Each..	3.00

Unless otherwise specified, we make these of 18 gauge steel.



D 2395.

STEEL HAND BARROWS.

Sizes Carried in Stock.

No. 40.	24 inches long, 18 inches wide, 6 inches deep.	Each.....	\$2.70
No. 42.	36 inches long, 18 inches wide, 8 inches deep.	Each.....	3.70

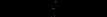
Unless otherwise specified, we make these of 16 gauge steel.



D 2396.

STEEL "TOTE" PAILS.

Sizes Carried in Stock.

	No. 50.	9 inches diameter, 8 inches deep, solid bottom.	Per doz.....	\$21.00
	No. 51.	11 inches diameter, 10 inches deep, solid bottom	Per doz.....	25.00
	No. 52.	9 inches diameter, 8 inches deep, perforated bottom.	Per doz..	22.00
	No. 53.	11 " " " " " "	" " "	26.00

Sides are made of 18 gauge, and bottoms of 16 gauge steel.

Sides are made of 18 gauge, and bottoms of 16 gauge steel.



D 2402.

RUBBER BELTING.

Endless Belts made to order, for which there will be three extra feet charged for splice. We make three qualities of belting, B. W. H. and Superior, both thoroughly guaranteed, and Tiger, guaranteed for light work only.

Endless Emery Belts take same list as Rubber Belt. These are made to order, for which there will be three feet charged for splice.

Size, inches.....	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8
2-ply, per foot.....	.07	.09	.11	.15	.18	.22	.26	.30	.33	.36	.43	.51	.59
3-ply, per foot.....				.17	.22	.26	.30	.34	.39	.43	.52	.60	.70
4-ply, per foot.....				.21	.26	.31	.37	.42	.47	.52	.62	.73	.84
5-ply, per foot.....							.53	.59	.65		.78	.91	1.05
6-ply, per foot.....											.93	1.10	1.26

Size, inches.....	9	10	11	12	13	14	15	16	18	20	22	24	We Cut Sheet Brass Special Sizes to Order.
2-ply, per foot.....	.67	.75	.83	.91	1.00	1.08	1.16	1.25	1.41	1.58	1.76	1.96	
3-ply, per foot.....	.80	.90	1.00	1.08	1.18	1.28	1.38	1.50	1.70	1.90	2.12	2.36	
4-ply, per foot.....	.95	1.07	1.18	1.30	1.42	1.54	1.66	1.78	2.02	2.26	2.52	2.80	
5-ply, per foot.....	1.18	1.33	1.47	1.62	1.77	1.92	2.07	2.22	2.52	2.82	3.15	3.50	
6-ply, per foot.....	1.42	1.60	1.77	1.95	2.13	2.31	2.49	2.67	3.03	3.39	3.78	4.20	



D 2403.

LEATHER BELTING.—Pure Oak Tanned.

Size, inches..	1	1¼	1½	1¾	2	2¼	2½	3	3½	4
Per foot.....	\$0.12	.16	.20	.24	.28	.32	.36	.44	.52	.60
Size, inches..	4½	5	5½	6	7	8	9	10	11	
Per foot.....	\$0.68	.76	.84	.92	1.08	1.24	1.40	1.56	1.72	
Size inches..	12	13	14	15	16	17	18			
Per foot.....	\$1.88	2.04	2.20	2.40	2.60	2.80	3.00			

Double belts twice the price of single. Extra heavy belts extra prices. We do not guarantee belts run on quarter turn, unless they are specially made for that purpose. We make two qualities of leather belting, Standard and Extra.

D 2404.

SOLID ROUND LEATHER BELTS.

Size, inches.....	1-8	3-16	1-4	5-16	3-8
Price, per foot.....	\$0.05	.07	.10	.14	.18

D 2405.

TWIST ROUND LEATHER BELTS.

Size, inches.....	1-8	3-16	1-4	5-16	3-8	1-2	5-8	3-4	7-8	1
Price, per foot.....	\$0.06	.10	.14	.18	.22	.30	.36	.46	.60	.72



D 2406.

CASTOR OIL BELT DRESSING.

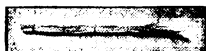
1 gallon, per gallon.....	\$1.00
2 " " " ".....	.90
5 " " " ".....	.80
10 " " " ".....	.75
Barrels, " " " ".....	.60



D 2407.

ROUND STEEL BELT COUPLINGS FOR ROUND AND TWIST BELT.

Size, inches.....	1-8	3-16	1-4	5-16	3-8	7-16	1-2
Price, per dozen.....	\$2.00	2.00	2.00	2.50	3.00	3.50	4.00
Size, inches.....	9-16	5-8	3-4	7-8	1	1 1-8	
Price, per dozen.....	\$5.00	6.00	9.00	13.00	18.00	22.00	

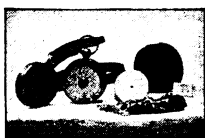


D 2408.

RAWHIDE AND TANNED CUT LACE.

Size, inches.....	1-4	5-16	3-8	7-16	1-2	5-8	3-4	1
Price, per 100 feet.....	\$1.00	1.25	1.50	1.75	2.00	2.75	3.25	4.50

Rawhide and Lace Leather Sides at market rates.

D 2412. THE HAUSBURG WATCHMAN'S CLOCKS.

Accepted as high grade and standard. 20 medals awarded: New Orleans, Melbourne, London, Paris, Vienna, Chicago. Welcomed by faithful watchmen—telltale upon careless watchmen. Pays for itself by difference in insurance rates.

"The Excelsior" the latest improvement in "Portable" Watchman's Clocks. The clock is enclosed in a brass case, 3 $\frac{3}{4}$ inches in diameter and 1 $\frac{1}{2}$ inches in thickness, and is carried by the watchman and the keys are attached by chains at those points in the territory where the watchman may be instructed to visit.

The registrations of this clock are made by punctures, and for this reason it is far superior to the old-fashioned kind by which a printed record is made. It is perfectly evident that the type mechanism will get out of order before Hausburg's simple perforator, consisting solely of a sharpened steel spring.

No watchman's clock is simpler in construction, nor can it endure harder use than this one. Absolutely reliable and cannot be tampered with.

Price, with Pouch, Box of 400 Paper Dials and 12 different Keys, with Chains for 12 Stations:

Complete (formerly \$75.00). \$50 00 | Extra Paper Dials (1 yr.'s s'ply) in bx. \$1.50
Complete for 5 Stations..... 45 00 | " Record Books, each..... 3.00

**D 2413.****MARSH'S NONPAREIL LACE CUTTERS.**

Try our
Brush
Copper for
Electrical
Work.

Price, each.....\$0.25

**D 2414.****BELT STUDS AND AWLS.**

Nos.....	6	5	4	3	2	1	0	00
Price, per 100.....	\$0.60	.70	.80	.90	1.25	1.65	2.00	2.50

Awls, 25 cents.

D 2415.**BELT HOOKS.—Per Thousand.**

No.	Price.	Length Inside.	No.	Price.	Length Inside.
15.....	\$2.00	9-16	8.....	\$ 5.00	13-16
14.....	2.40	5-8	7.....	6.00	13-8
13.....	2.60	5-8	6.....	8.50	15-8
12.....	2.80	5-8	5.....	11.00	17-8
11.....	3.00	11-16	4.....	14.00	21-8
10.....	3.50	7-8	3.....	16.00	23-16
9.....	4.00	1	2.....	20.00	23-16

**D 2416. CORRUGATED COPPER WIRE PACKING AND GASKETS.**

Cuts show Gaskets as sold, ready for use. From $\frac{1}{4}$ inch to 17 inches, inside diameter.

This Packing has been thoroughly tested and is now coming into general use on Ocean Steamers, Railroads, and Stationary Engines. The joints will not leak, and the Gasket will not burn out, neither can it be blown

out. *It will last as long as the material that it connects.*

In bundles of about 25 pounds each, or less, suitable for making Gaskets.

Nos. 1, 2, 3 (No. 1 is the smallest and No. 3 the largest), per lb.....\$1.50

PRICES, IN ANY QUANTITY.

Inside Diam., in...	9-16	11-16	7-8	1	1 1-4	1 5-8	1 7-8	2 5-16
For Union, inches.	2	2	2	2	1	1	1	1
Price, per 100.....	\$2.00	2.50	3.00	3.50	4.00	4.50	5.00	6.00

Gaskets, Inside Dia., in.	3	3 1-2	4	4 1-2	5	5 1-2	6	6 1-2	7	7 1-2
Price, each.....	8c.	10c.	11c.	12c.	15c.	18c.	21c.	25c.	30c.	35c.

Gaskets, Inside Dia., in.	8	9	10	11	12	13	14	15	16	17
Price, each.....	40c.	45c.	50c.	55c.	60c.	65c.	70c.	75c.	80c.	85c.

SPECIAL NOTICE.—Should the joints leak when pipes have cooled after this packing has been used for the first time, tighten them until leaking stops, and they will remain perfectly tight in future.

RUBBER PACKINGS.

**For Useful
Tables, see
Back of
Book.**

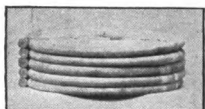


**D 2422. SHEET RUBBER PACKING,
CLOTH INSERTION.**

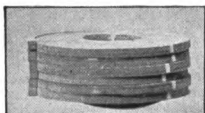
Cloth one or Both Sides.

Thickness, inches.....	1-64	1-32	1-16	3-32	1-8	3-16	1-4
1 ply, per pound.....	\$0.70	\$0.65	\$0.60	\$0.55			
2 " " " ".....			.63	.58	\$0.55		
3 " " " ".....			.66	.61	.58	\$0.55	
4 " " " ".....					.61	.58	\$0.55

There is one ply of cloth to every 1-16 inch thickness. Each cloth whether insertion or on outside, to count as one ply. Three cents per pound additional will be charged for each extra ply of cloth.



D 2423. Round Piston Packing.



D 2424. Square Piston Packing.



D 2425. Square Flax Packing.

D 2423 or D 2424. Price, per pound.....\$0.85

D 2424.	Square Piston Packing, <i>Rubber Back</i> . Per pound.....	1.00
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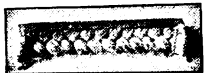
D 2425.	Square Flax Packing. Per pound.....	.60
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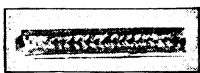
D 2426. GARLOCK PACKINGS.

Sectional Ring, Elastic Ring or Spiral Packing. Per pound.....

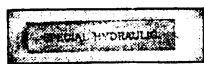
GOODSELL'S PACKINGS.



D 2427. Rubber Back Flax.



D 2428. "Dollar" Packing.



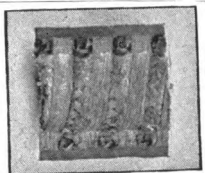
D 2429. Plain Hydraulic.

D 2427. Goodsell's Rubber Back Flax Packing. Per pound.....\$1.50

D 2428.	"	"Dollar" Packing.	Per pound.....	1.00
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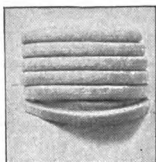
D 2429.	"	Plain Hydraulic Packing. Per pound.....	.50
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D 2430.	"	Rubber Back Hydraulic Packing, Per pound.....	.60
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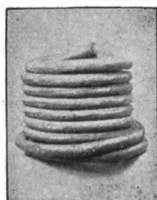


D 2431. GOODSSELL'S SLEEVE PACKING.

Goodsell's Sleeve Packing. Per pound.....\$1.00



D 2432. Round Gum Core Packing.



**D 2433. Oval Gum
Core Packing.**

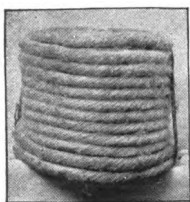


D 2434. American Anti-Friction Packing.

D 2432. Round Gum Core Packing. Price, per pound.....	\$0.60
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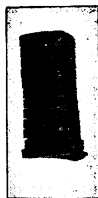
D 2432.	Round Gum Core Packing.	1.00, 1.00, 1.0085
D 2433.	Oval Gum Core Packing.	" " "85

D 2433.	Oval Gum Core Packing.	"	"75
D 2434.	American Anti-Friction Packing.	"	"	.....	.75



PACKINGS.

D 2440. Italian A Hemp Packing.	
Per pound.....	\$0.20
D 2440. American Extra Refined Hemp. Price, per pound.....	.15
D 2441. The Electric Rubber Back Spiral Packing. Price, per lb..	1.20



D 2440. Hemp Packing.

D 2441. Electric Rubber Back Spiral Packing.



WICKING.

D 2442. Candle Wicking. Per lb.	\$0.25
D 2443. Asbestos Wicking. Per lb.	.40



D 2442. Candle Wicking.

D 2443. Asbestos Wicking.

MISCELLANEOUS PACKINGS.

	Per lb.		Per lb.
Empire Gum Core Packing, square, round or oval, on reels.	\$0.50	Usudurian Sheet Packing, in rolls.....	\$0.80
Eureka Gum Core Packing, square, round or oval, on reels.	.75	Vulcabestos Rope Packing.....	1.00
Tupper's Flax Packing, in box..	.85	Vulcabestos Sheet Packing.....	1.00
Jenkin's Sheet Packing.....	.80	Crandall Packing.....	1.20
Selden's Gum Core Packing, in coils.....	.60	Rainbow Packing.....	.80
Selden's Canvas Core Packing, in coils.....	.50	Knowlton Imported Ring Packing.....	1.25
Soapstone Packing, on reels.....	.25	Manhattan.....	1.00
		Rawhide Packing.....	2.00



D 2444.

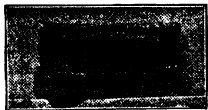
COTTON WASTE.

Number.....	1	2	3
White. Per pound.....	\$0.10	\$0.09	....
Colored. " " .....	.08	.07	\$0.06

For less than full bales 1 cent per pound will be added to price.

Special Drills, Made to Order.

D 2445. SILK TOWELS FOR WIPING MACHINERY.



12x12 inches, unhemmed. Per doz.....	\$1.00
15x15 " " " "	1.50
12x18 " " " "	1.50
12x12 " hemmed " "	1.10

For the convenience of those who wish to use the Towels in dimensions other than above we will furnish the silk cloth any length desired, one yard wide. | Price, per yard.....\$0.75

D 2446. C. H. BESLY & CO.'S FORGED STEEL SCREW PUNCHES.



No. 00, punches 5-16 inch hole in 1-4 inch iron, 1 1-2 inches from edge of sheet.....	\$20.00
No. 0, punches 7-16 inch hole in 1-4 inch iron, 1 1-2 inches from edge of sheet.....	24.00
No. 1, punches 1-2 inch hole in 5-16 inch iron, 1 1-2 inches from edge of sheet.....	30.00
No. 2, punches 3-4 inch hole in 1-2 inch iron 2 inches from edge of sheet.....	40.00
No. 3, punches 3-4 inch hole in 3-4 inch iron, 2 1-2 inches from edge of sheet.....	60.00

One punch and die furnished. Extra punches and dies per pair: Nos. 00 and 0, \$3.00; Nos. 1 and 2, \$4.00; No. 3, \$5.00.

ENGINEERS' SUPPLIES.



D 2452.

RED JACKET STEAM FLUE CLEANERS.

Number.....	0	1	2	3	
Size of tubes, outside diameter, in.	1½ to 1¾	2 to 2½	2½ to 2¾	3 to 3½	
With clamps and nipple, each.....	\$5.00	5.00	6.25	7.50	
Best 4-ply steam hose, per foot....	½-in. 51c.	½-in. 51c.	¾-in. 67c.	1-in. 83c.	
Number.....	4	5	6		
Size of tubes, outside diameter, in.	3½ to 3¾	4 to 4½	5 to 6		
With clamps and nipple, each.....	\$8.75	10.00	12.50		
Best 4-ply steam hose, per foot....	1-in. .83c.	1¼-in. \$1.04	1½-in. \$1.04		

The above prices do not include hose.



D 2453.

KELLEY'S AUTOMATIC STEAM FLUE CLEANER.

Double Blower.

1st. It is light and easy to handle. Hold the cleaner firmly with both hands, and by pressing lightly against the end of flue, admit the steam. The valve will close automatically.

2d. Fifty flues can be cleaned in six minutes.

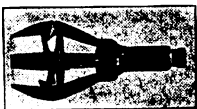
3d. They are made of the best brass steam metal, and will last, as they will not corrode and be worthless after short usage.

4th. They can be adjusted to clean a very long boiler, as well as a short one, by turning nuts on guide screws on cleaner head, and no soot is ever left on the back end of flue by these cleaners.

5th. Every cleaner is thoroughly tested before leaving the shop.

PRICES AND SIZES OF THE AUTOMATIC BLOWER.

No. 1.	Fits flues from 1 to 1½ inch, requires ¾ inch hose, price each...	\$ 7.00
No. 2.	" " " 1¾ to 2½ " " " " " " " " " " " "	8.00
No. 3.	" " " 2¾ to 3¼ " " " " " " " " " " " "	9.00
No. 4.	" " " 3½ to 4 " " 1½ " " " " " " " " " "	10.00



D 2454.

KELLEY'S ADJUSTABLE STEEL FLUE SCRAPER.

A few of the good points:—The scraping bars are shearing and always have a sharp cutting edge, are made of steel, are hardened, but will not break.

They can be adjusted to any tension of spring desired to do good work by turning the nut on back end of scraper. The springs are independent of any other part of the scraper and are protected from the heat, a feature found in no other scraper, and one which makes it much more durable, as the springs never lose their temper. They are short and can be used in boilers where other scrapers cannot. There is a central disk on body of scraper that removes all soot from flues and by passing the scraper once through the flues cleans them thoroughly.

LIST OF SIZES, WITH PRICES.

No. 1.	2 inch tube, inside diameter 1¾ inch, each.....	\$2.00
No. 2.	2½ " " " " 2¾ " " " " " " " " " " " "	2.50
No. 3.	3 " " " " 2¾ " " " " " " " " " " " "	3.00
No. 4.	3½ " " " " 3¼ " " " " " " " " " " " "	3.50
No. 5.	4 " " " " 3¾ " " " " " " " " " " " "	4.00

When ordering, give inside diameter of tubes.



D 2455.

"THE ENGINEERS' FAVORITE" FLUE SCRAPER.

Price, all sizes, per inch.....\$1.00



D 2456.

ELLIPTIC SPRING STEEL AND ADJUSTABLE TUBE SCRAPER.

Warranted to remove any scale or blister and pass ferrules.

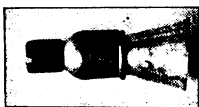
Size, inches..	1 to 2	2½	2¾	3	3¼	3½	3¾	4
Price, each...	\$2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00



D 2457.

WIRE FLUE BRUSHES.

Price, per inch.....\$1.00



Cuts the scale, carries all accumulations forward, and cleans the tube at one operation. Thousands in use.

Inch....	1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5	6	7	8	9
Price...	\$1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	4.00	4.50	5.00	6.00	7.00	8.00	9.00

Steel cones supplied at half scraper prices.



For cleaning your flue, (either smoke or water).
No lost time or labor. It cuts both ways. Cleans spliced flues all O. K. It removes scale and lime slick and clean. Use it and get a quarter more steam with same fuel. 15 days given for trial and acceptance. Satisfaction guaranteed or no sale.

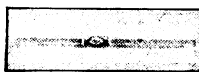
6 inch Scraper.....	\$7.50	Sizes between 2 and 3 inches.....	\$3.75
4 " ".....	5.00	" " 3 and 4 ".....	5.00
3 " ".....	3.75	" " 5 and 6 ".....	7.50
2 " ".....	2.50		

Diam., inches...	1	1¼	1½	1¾	1⅞	2	2¼	2½	2¾
Price, each.....	\$10.00	10.00	10.00	10.00	10.00	12.00	12.00	14.00	16.00

Diam., inches...	3	3¼	3½	3¾	4	4¼	4½	5	6
Price, each.....	\$18.00	20.00	23.00	25.00	30.00	35.00	40.00	50.00	60.00

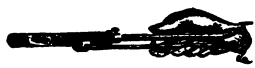


Outside diameter of tube, inches,	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4
Price, each.....	\$8.00	8.00	9.00	11.00	12.00	13.00	15.00	18.00
Outside diameter of tube, inches,	3	3 1/4	3 1/2	4	4 1/2	5	6	
Price, each.....	\$22.00	26.00	30.00	33.00	37.00	42.00	60.00	



Length, in.	10	11	12	13	14	15	16	17	18	19	20	22	24	30	36	48	60
$\frac{1}{2}$ in. each.	.25	.27	.30	.32	.35	.37	.40	.42	.45	.47	.50	.55	.60	.75	.90	1.21	1.51
$\frac{3}{8}$ in. each.	.25	.27	.30	.32	.35	.37	.40	.42	.45	.47	.50	.55	.60	.75	.90	1.21	1.51
$\frac{1}{4}$ in. each.	.30	.33	.36	.40	.43	.46	.49	.52	.55	.59	.62	.68	.74	.93	1.12	1.50	1.88
$\frac{1}{8}$ in. each.	.51	.56	.61	.66	.71	.76	.81	.86	.91	.96	1.01	1.12	1.22	1.52	1.83	2.43	3.04

Showing through the water a broad line of a rich red color, thus rendering it very distinct. Height of water in boiler can be seen instantly and as plainly by night as by day. These glasses have stood a test of 5,000 pounds pressure.



For cutting water glasses for steam boilers to any desired length. It will cut a glass tube as easily as a diamond will cut a light of glass, and will leave the end *straight and square*, a result not always attained by any of the old methods.

DIRECTIONS.—Place the Cutter *inside* the glass and revolve the tube with the left hand against the Cutter and the thumb of the right hand, being careful not to press hard against the gauge. *Break while the Cutter is still in the groove.*

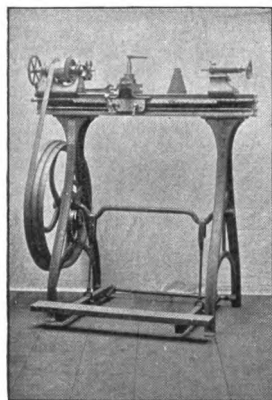
Price, each.....	\$0.50
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D 2474.

BARNES' No. 4 IMPROVED LATHE.

This Lathe is designed for turning both wood and iron, and for boring, drilling, polishing, etc. It is a desirable size for small work, and has many important advantages in the construction and arrangement of its parts. It swings 7 inches and takes 20 inches between centers. Having our Patent Velocipede Foot-Power and Improved Seat, the operator sits comfortably in the best possible position for the management of his work and he can work steadily without fatigue. The speed can be varied from 1,000 to 2,000 revolutions per minute, and the motion can be started, stopped or reversed instantly, at the will of the operator. Greater power can be applied on the work, than with any old style foot-power, and with greater ease. The Lathe is made entirely of iron and steel. The bed is solid, and has V-shaped projections, over which the head and tail stocks and hand and slide rests are fitted. The lead screw for the carriage is operated by hand; by it the carriage can be traveled 20 inches, the entire distance between the centers. The carriage can be engaged or disengaged instantly from the lead screw. The upper or cross feed way on which the tool post moves can be set at any desired angle, and tapers can be turned and taper holes can be bored to the extent of its travel. The tail stock can be moved and set at any point desired, by the simple turning of a hand-wheel; or it can be taken off entirely, thus leaving the bed free for face-plate or chuck work. The head stock spindle has taper bearings, and is capable of very nice adjustment. The tail stock center is self-discharging.

The price of the Lathe is \$40.00. This includes face-plate, two pointed centers and one spur center, hand rest, wrenches and necessary belting, as shown in cut. The Lathe weighs 210 lbs. Boxed, ready for shipment, 265 lbs.

D 2475. BARNES' NEW SCREW CUTTING LATHE, No. 4½.

This Lathe we have put on the market to meet the demand for a screw-cutting Lathe somewhat smaller and lower priced than our No. 5 Lathe. It is a back-gear screw cutting Lathe. It feeds right or left, and cuts screws right or left without change of gearing. The carriage is adjustable for taper boring. It is thoroughly gibbed for taking up wear. The tail stock has side movement to adjust centers for turning tapers. The head stock has hollow spindle for rods up to ¾ inch. All the gearing is cut from solid metal. All parts are made of steel where this would best serve the purpose. It will cut all ordinary threads from 5 to 48, and miscellaneous threads up to 154. It swings 9 inches, and takes 25 inches between centers. It swings 4½ inches over tool carriage. The small pulley on cone is 2½ inches; the large pulley 4½. It has three speeds, and is suitably arranged for heavy or light work in turning or polishing.

The Lathe weighs 270 lbs. Boxed ready for shipment, 340 lbs. Price \$70.

The pulleys on Countershaft for No. 4½ Lathe are 7x1½ inches, and should be speeded 250; and on Counter-shaft for No. 5 Lathe 7x2 inches, speed 225.

Price of Countershaft, \$15.00. We can furnish either Lathe with Countershaft in place of Foot power at same price as with Foot power.

D 2476.

BARNES' NEW No. 5 LATHE.

This Lathe swings 11 inches on the face plate, 6½ inches over the tool carriage, and is 34 inches between centers. With its back gearing and cone pulleys the Lathe has a great range of speed. It is thoroughly and substantially built of iron and steel, each used where it will best serve. The head-stock has a steel spindle with 15-32 inch hole through its entire length. The boxes are accurately fitted to the spindle, with provision to keep them true and to take up wear. The tail-stock can be readily set at any desired point, or taken altogether from the lathe bed, thus leaving it free for face-plate or chuck-work. It can also be set over for turning tapers. The spindles of both head and tail stocks are of steel, with positively true taper holes for the

reception of the centers, and the tail-stock center is self-discharging. The tool carriage is a model of convenience and accuracy, and is *gibbed* to the bed.



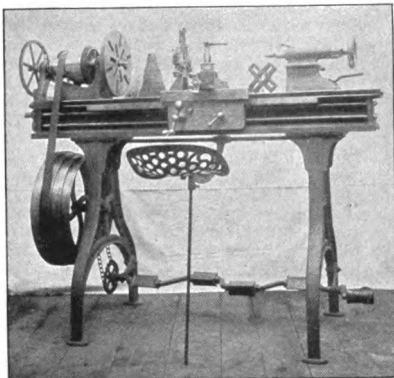
is \$100. It weighs 385 lbs. Boxed, ready for shipment, it weighs 500 lbs.

BED—EXTRA LENGTH.—For Gunsmith and other classes of work, greater distance between centers than 34 inches is required and we can furnish to No. 5 Lathe with bed to take 40 inches between centers at an advance of \$5.00, making price of Lathe with long bed \$105.00.

For \$10.00 extra we can furnish fixtures to raise the head and tail stocks and tool to bore out and swing seventeen inches in diameter.

HAND REST.—The Lathes Nos. 4½, 5, 5½ and 6 are built for metal turning, but can be speeded high enough so that wood turning can be done to very good advantage. For wood turning a hand rest is required, which we can furnish, the price of this rest for No. 4½ Lathe being \$2.50; for No. 5 Lathe \$3.00, and for Nos. 5½ and 6 Lathes, \$3.50.

D 2482. BARNES' No. 5½ SCREW CUTTING ENGINE LATHE.



The No. 5½ Lathe is designed to do as large work as it is practical to do by foot power. It is a strong, substantial Lathe for a job or manufacturing shop where the demand on a Lathe is from the smallest to the largest work.

It is low in price because it has our patent twin screw feed and screw cutting combination, which makes change of feed in the tool carriage instead of in the head stock. This greatly simplifies and reduces the number of parts commonly used for these purposes.

The tail stock has side movement to adjust centers for turning tapers. The head stock has hollow spindle for rods up to

one-half inch. All the gearing is cut from solid metal. All parts are made from steel where this would best serve the purpose. It will cut all ordinary threads from 4 to 40, and miscellaneous threads up to 154.

The dimensions and prices are as follows:

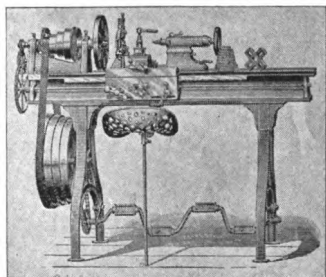
L'gth of Bed.	Distance Between Centers.	Swing on Face Plate.	Swing over Tool Carriage.	Hollow Through Spindle.	Weight of Lathe.	Weight Boxed.	Price.
5 ft.	33 in.	13 in.	8 in.	17-32 in.	640 lbs.	775 lbs.	\$135.00
6 ft.	45 in.	"	"	"	690 lbs.	830 lbs.	150.00
7 ft.	57 in.	"	"	"	740 lbs.	890 lbs.	165.00
8 ft.	69 in.	"	"	"	790 lbs.	950 lbs.	180.00

COUNTERSHAFT FOR NOS. 5½ AND 6 LATHES.

The pulleys on this Countershaft are 7x2 inches, and should be speeded 225. Price of Countershaft, \$20.00. The prices on 5½ and 6 Lathes advance \$5.00 where Countershaft is taken instead of foot power.

We regard the Velocipede Power as the best for a foot Lathe, but are prepared to furnish our Lathes with Treadle Power, when for any reason it is preferred. This Treadle Power we guarantee to be equal to any on the market. Both styles same price. For illustration of Lathe with Treadle Power, see p. 223.

D 2487. BARNES' No. 6 SCREW CUTTING ENGINE LATHE.
New Pattern.



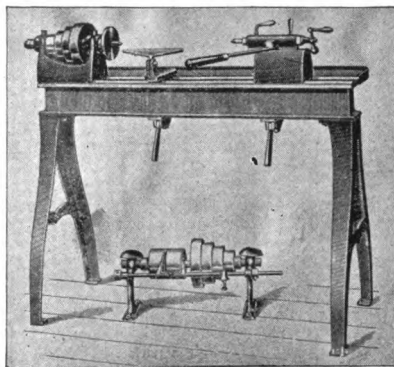
This lathe embodies those features which go to make up a first-class lathe; one that has all the necessary appliances for the rapid and accurate execution of both light and heavy work. Having our patent velocipede foot power and improved seat, the operator sits comfortably in the best possible position for the management of his work, and can work steadily without fatigue. Motion can be started, stopped or reversed instantly, at the will of the operator, and from one-fourth to one-third more power can be applied on the work than with any old

style foot power, and with greater ease. The seat can be moved readily to any part of the bed that the work requires. It is thoroughly and substantially built, and the best material for each part is used. The headstock has a hollow steel spindle that will take a $\frac{1}{2}$ inch rod through its entire length. The boxes are accurately fitted to the spindle, with provision to keep them true and take up wear. The tail stock can be readily set at any desired point, or taken altogether from the lathe bed, without removing nuts or bolts. It can also be set over turning tapers. The spindles for both head and tail stocks are of steel, with positively true taper holes for the reception of the centers, and the tail stock center is self-discharging. The tool carriage is a model of convenience and accuracy, and is gibbed to the bed. The tool can be set to the work at any position or angle desired, also to bore a taper hole. All the works are securely protected from chips and dirt, thus insuring long wear and durability to the most costly and vital parts of the lathe. It has a splined screw, giving rod feed for turning, reserving the screw for thread cutting only. By a lever in the apron of the tool carriage, the feed can be graduated instantly from coarse to fine, and vice versa.

L'gth of Bed.	Distance Between Centers.	Swing on Face Plate.	Swingo'er Tool Carriage.	Hollow Through Spindle.	Weight of Lathe.	Weight Boxed.	Price.
5 ft.	33 in.	13 in.	8 in.	17-32 in.	640 lbs.	775 lbs.	\$150.00
6 ft.	45 in.	"	"	"	690 lbs.	850 lbs.	165.00
7 ft.	57 in.	"	"	"	740 lbs.	890 lbs.	180.00
8 ft.	69 in.	"	"	"	790 lbs.	950 lbs.	195.00

For \$15.00 extra we can furnish fixtures to raise the head and tail stocks and tool post to bore out and swing 18 inches in diameter. Countershaft for No. 6 Lathe is shown on page 224.

Badger Die Stock
Always Cuts Same Size.



D 2488.

LITTLE GIANT LATHE.

Length of Bed 4 feet.
L'gth betw'n Centers 26 inches
Swing..... 11 "
Weight 300 lbs.

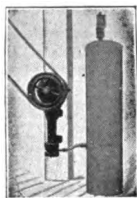
PRICE :

With Countershaft \$60.00

Has hollow spindle; hole in spindle, 7-16 inch. Has both screw and lever feed for tail spindle.

A thoroughly well made tool.

D 2489. THE BESLY TIRE INFLATOR.

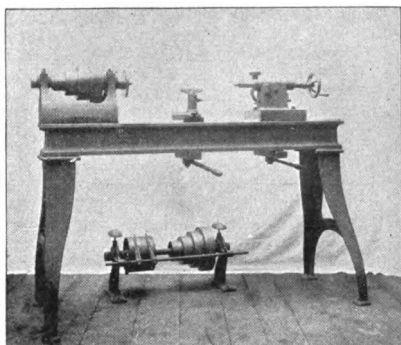


This is a very desirable Tire Inflator that we have sold largely to manufacturers of bicycles and for repair shops. It consists of a vertical power air compressor, connected with a receiving tank. This tank being supplied with a pop safety valve as shown in cut so as to retain a uniform pressure, and with an outlet by which air may be conducted by hose or line of piping and by means of stop-cock transmitted to tires at will. Outfit complete, Air Pump, receiving Tank and Valve, \$100.00.

D 2495.

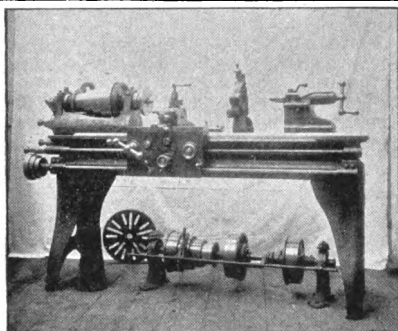
C. H. BESLY SPEED LATHE.

15 inch Swing, 5 foot Bed.



The live spindle is of steel running in the very best babbitt boxes. The front bearing is $1\frac{1}{2} \times 3$ inches. The cone has four speeds for 2 inch belt; the tail stock has set-over and quick return spindle. The countershaft has tight and loose pulleys $7 \times 2\frac{1}{2}$ inches, and should make 250 revolutions per minute. This Lathe is well made in every respect, and care has been taken to make the proportions such that the greatest amount of work can be produced in the least time, distributing the work evenly over the frictional and strained parts. This Lathe is designed

to meet the wants of brass and light metal workers. Price each, \$80.00.



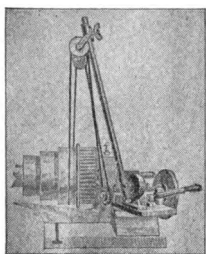
D 2496.

**C. H. BESLY & CO.'S
ENGINE LATHES,**

Made in the following sizes:

16 inch Lathe	6 ft. Bed.
16 " "	8 " " "Special
18 " "	10 " " "Taps,
20 " "	10 " " "Reamers,
20 " "	12 " " "Milling
24 " "	12 " " "Cutters,
24 " "	12 " " "Made to
	Order.

Write for descriptive circular and full particulars.

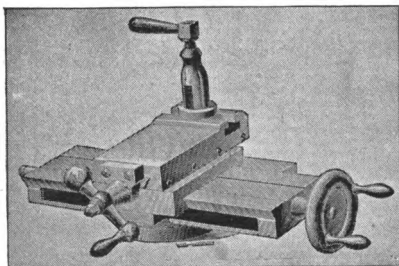
**D 2497. WOODWARD'S LATHE CENTER
GRINDER.**

This Grinder can be attached to a lathe in the time required to grind and set a tool, truing the center as fast and very much better than the tool.

A hardened ground head center will last ten times longer and remain truer than the usual soft ones. For dead centers, it saves time retempering, which also injures the steel. It is so much more convenient, that a lathe man will keep his centers in better shape. In ordering, give size of your largest face-plate.

Price, including Belt and Wheel....\$20.00

D 2498.

DIAMOND SLIDE RESTS.

These Slide Rests are made from new patterns, and are very strong and well proportioned in all their parts. The sliding surfaces are carefully fitted. The screws are all made of steel. The handles are made of a convenient shape and nicely finished. All wearing surfaces have adjustable gibs for taking up wear. The tool post has an arrangement for raising or lowering the tool, which can be quickly ad-

justed. These Slide Rests are guaranteed to be first class, and to give satisfaction in every respect.

Price, not including Tools: 10 inch Swing, 10 inches Long..... \$27.50
 " " " 13 " " " 13 " " " 37.50
 " " " 16 " " " 15 " " " 50.00

D 2504.

**"LITTLE GIANT" BLACKSMITH'S
DRILLING MACHINE, No. 5.**

This is a strong, serviceable Drill Press. Although we have put the price of this machine low, nothing has been left undone to make it the most perfect, compact and thoroughly well made Drill on the market for the price.

General Dimensions and Points.

Drills to one inch diameter hole.

Drills to center of 15-inch circle.

Table is removable for Drilling Tire or can be swung to side, instantly adjustable to height.

Bed is of iron, cast in one piece, giving machine strength and stiffness.

Spindle is steel, with tool steel set screw hardened and tempered.

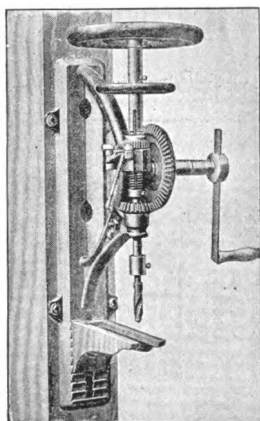
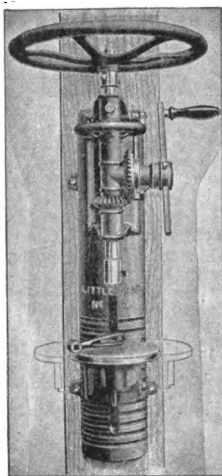
The feed has a run of 4 inches.

The table has an adjustment of 11 inches.

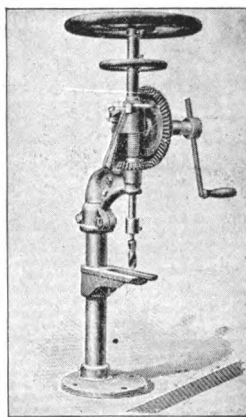
Spindles are made to receive 1-2 inch or 41-64 shanked drills. Unless otherwise ordered, spindles with 1-2 inch hole will be sent.

An iron bed machine. All parts interchangeable. Table of this machine is perfectly square with spindle.

Price, each.....\$10.00



D 2505, 4B.



D 2506, 7B.

**Badger
Die
Stocks
for
Bicycle
Use.**

IMPROVED FORCE FEED POST DRILL.**D 2505. NEW No. 4B.**

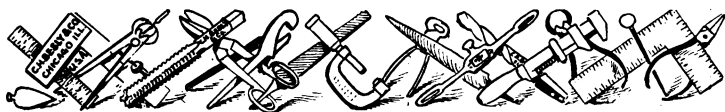
This machine is our late improved Post Drill. It has self feed, which is adjustable and can be used or not as may be desired. We claim and can demonstrate to the satisfaction of any buyer that it is the most powerful post drill made of its size. 41-64 shank drill required for this drill. No. 4B will bore a hole from 1-8 inch to 3-4 inch.

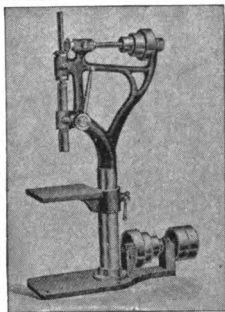
Swings 24 in.; vertical motion, 3 in.; weight, 120 pounds; price, \$30.00.

D 2506, 7B. IMPROVED COLUMN AND FORCE FEED DRILL.

This drill has all the late improvements, including self feed, which is adjustable and can be used or not at the option of the operator. For blacksmiths and carriage makers this drill has no equal. It will drill a hole one inch in diameter with perfect ease and safety. It is not disputed that it is the strongest and easiest running drill on the market. 41-64 shank drills required for this drill. No. 7B will bore a hole from 1-8 to 1 inch.

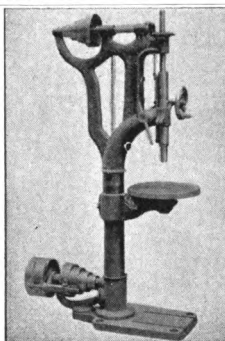
Length of column, 19½ in.; Swings, 16 in.; Diameter, 3 in.; weight, 150 pounds; table has vertical motion, 8 in. | Price.....\$50.00



**D 2512. SENSITIVE BENCH DRILL.**

This drill is designed for all kinds of light drilling in hard or soft metal, and is highly recommended for use in bicycle or electrical works. It is capable of drilling holes up to 3-8 of an inch in diameter.

SPECIFICATIONS.—Greatest distance from spindle to table, 17 inches; vertical adjustment of table on column, 14 inches; table is 7 1-2 long by 7 1-2 inches wide; vertical traverse of spindle, 3 1-2 inches; drills to the center of 8 inches; extreme height, 35 inches; weight, 75 pounds. Countershaft has three changes of speed for one-inch belt; speed of countershaft, 350 revolutions per minute. | Price, each, \$30.00

**D 2513. 20-INCH UPRIGHT DRILL.**

Lever or wheel feed. Counterbalance Spindle, with quick return movement.

SPECIFICATIONS.

Swings 20 inches. Greatest distance from spindle to base plate, 43 inches.

Diameter spindle, 1 9-16 inches.

Hole in spindle to fit Morse taper.

Width of belt or drill, 2 3-8 inches.

Driving pulley, 10 inches diameter, 3 inches face.

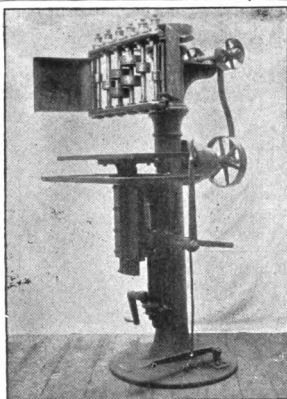
Table, 18 inches diameter.

Speed of lower shaft, 240 revolutions per minute.

Weight, 700 pounds.

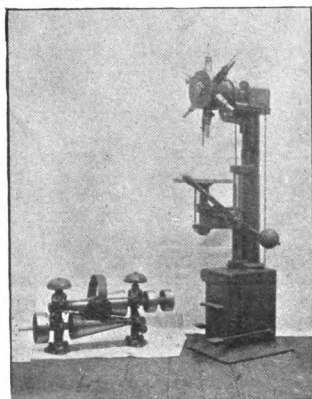
Price, each.....\$75.00

Gardner
Die Stock is
Adjustable.

**D 2514.****PRATT & WHITNEY'S No. 1 SIX-SPINDLE UPRIGHT GANG DRILLS.**

No.	No. Spindles.	Diam. of Spindles.	Sizes Drills may be Used.....	Distances between			Weight with Countershaft.
				Table and Spindle	Gen. of Spindl's	Gen. of Spind. & Column	
1	6	15-16	1-16 to 3-8 in.	2 to 16	3 3/4	5 1/2	800

Diameter and width of face of the light and loose pulleys of the countershafts, 12 inches and 2 3/4 inches; number of revolutions per minute, 300. Price, each.. \$260.00

**D 2515. QUINT'S No. 1 FRICTION SIX-SPINDLE TURRET DRILL**

For light drilling. Only the spindle in use revolves. The work remains in place during the different operations. Drill spindles have independent drill stop.

SPECIFICATIONS.—Longest distance from table to end of spindle, 18 1/4 in.; shortest distance from table to end of spindle, 1 in.; distance from center of drill to face of column, 10 in.; vertical movement of table, 4 1/2 in.; speed of drills, 250 to 2,000 revolutions with patent cone countershaft; speed of drills 350 to 1,400 revolutions with common countershaft; speed of all countershafts, 350 revolutions; diameter of table, 18 1/4 in.; height from floor to center of turret, 57 in.; width of base, 14 1/2 in.; length, 19 in.; total weight, ready for shipment, 430 pounds. | Price, each.....\$220.00

D 2521. HARRINGTON'S DOUBLE CHAIN SCREW HOISTING MACHINES.

One man can lift to the full capacity of each machine. On the smaller size, 35 pounds lifts 1,000 pounds. These blocks have two independent working chains, so the load being carried on two distinct chains instead of one, the possibility of accident is reduced.



Capacity. Tons.	Will Lift. Feet.	Weight Complete. Pounds.	Price Complete.	Extra Lift Per Foot.
$\frac{1}{4}$	8	35	\$ 22.50	\$1.00
$\frac{1}{2}$	8	52	25.00	1.20
1	8	65	30.00	1.50
$1\frac{1}{2}$	8	76	40.00	1.75
2	9	140	55.00	2.00
3	10	226	75.00	2.20
4	10	258	95.00	2.40
5	12	625	140.00	3.00
6	12	750	180.00	3.75
8	12	875	260.00	4.75
10	12	925	340.00	6.00

Four feet of chain is necessary for each extra foot of hoist.

PRICE LIST OF PARTS FOR HARRINGTON'S DOUBLE CHAIN SCREW HOISTING MACHINE.

Capacity, pounds.....	500	1000	2000	3000	4000	6000	8000	10,000	12,000	16,000	20,000
Hand Chain Wheel.....	1.27	1.47	1.65	2.75	4.46	4.96	6.29	9.29	12.00	.....	.....
Worm Gear Wheel.....	1.79	2.01	2.67	3.50	4.65	4.85	6.25	8.56	11.22	.....	17.54
Lift Chain Wheels, pair.....	2.12	2.32	2.50	3.00	4.15	4.90	6.23	9.23	11.83	.....	.....
Lift Chain, per foot.....	.35	.35	.40	.46	.50	.55	.65	.75	.90	1.10	1.20
Hand Chain.....	.19	.25	.25	.25	.30	.30	.35	.45	.45	.45	.45
Case, bottom and top, in two pieces.....	1.80	2.00	2.50	3.00	4.15	5.15	6.48	9.48	12.14	.....	16.89
Worm.....	1.50	1.66	1.83	3.00	4.14	4.64	5.97	9.00	11.63	.....	17.46
Hand Chain Guard.....	1.12	1.32	2.00	2.67	.....	.....	.....	.....	.....	.....	.....
Bottom Hook and Swivel.....	1.75	1.94	2.12	2.37	3.52	4.52	5.85	8.85	11.51	.....	.....
Side Plates, right and left.....	.35	.52	1.00	1.66	2.81	3.81	5.14	6.15	10.80	.....	.....
Top Hook and Swivel.....	1.75	1.95	2.13	2.38	3.53	4.53	5.86	8.86	11.52	.....	.....
Hand Chain Guard and Gland.....	.....	.....	.....	.....	3.00	3.50	4.50	5.56	7.06	.....	.....

Special
Taps.
Any Size,
Made to
Order.

D 2522. MOORE'S DIFFERENTIAL CHAIN BLOCKS.

One man can lift to the full capacity of each block.



Capacity. Tons.	Will Lift. Feet.	Weight Com- plete. Pounds.	Short'st Dist'a'ce Betw'n Hooks.	Price Com- plete.	Extra Main Chain Price per Ft.	Extra Hand Chain. Price Per Foot.
$\frac{1}{2}$	7	39	16	\$25.00	\$0.40	\$0.40
1	8	73	20	30.00	.44	.40
$1\frac{1}{2}$	$8\frac{1}{2}$	90	21	40.00	.48	.40
2	9	128	23	50.00	.52	.40
3	10	195	29	70.00	.60	.40
4	11	250	32	95.00	.60	.40
5	12	353	36	125.00	.80	.40
6	12	400	37	150.00	.80	.40
10	12	580	41	250.00	1.50	.40

Two feet of both main and hand chain is necessary for each extra foot of hoist.

PARTS OF MOORE'S BLOCK.

Capacity. Tons.	Hand Wheel. Price Each.	Lift Wheel, with Flange. Price Each.	Lift Wheel, without Flange. Price Each.	Pinion. Price Each	Lower Hook, with Yokes. Price Each.	Upper Hook. Price Each.
$\frac{1}{2}$	\$1.50	\$2.00	\$2.00	\$1.50	\$2.00	\$1.50
1	1.75	2.25	2.25	1.75	2.50	2.00
$1\frac{1}{2}$	2.00	2.50	2.50	2.00	2.75	2.25
2	2.25	3.00	3.00	2.25	3.00	2.50
3	2.50	3.50	3.50	2.50	3.50	3.00
4	3.00	4.50	4.50	3.00	4.00	3.50
5	4.00	6.00	6.00	3.50	5.50	5.00
6	4.00	7.00	7.00	4.00	6.00	5.50
10	6.00	10.00	10.00	5.00	8.00	7.00

D 2529. WESTON'S DIRECT DIFFERENTIAL BLOCKS.

One man can lift 1,000 pounds. It will hold the load at any point and can not run down. Lifting and lowering effected by pulling opposite sides of the slack chain.



Capacity. Tons.	Chain in Block of Regular Lift. Feet.	Will Lift. Feet.	Wt., lbs. Com- plete.	Price, Each.	Extra Chain, per ft.
$\frac{1}{4}$	22	6	22	\$13.00	\$0.36
$\frac{1}{2}$	26	7	30	15.00	.38
1	30	8	51	20.00	.40
$1\frac{1}{2}$	33	$8\frac{1}{2}$	81	25.00	.42
2	36	9	122	30.00	.44
3	38	10	173	40.00	.48

Allow 4 feet of chain for each extra foot of hoist.

PARTS OF WESTON'S DIRECT BLOCKS.

Capacity. Tons.	Sheaves.		Yokes & Hooks.		Pins.	
	Top.	Bottom.	Top.	Bottom.	Top.	Bottom.
$\frac{1}{4}$	\$1.50	\$0.75	\$2.50	\$2.00	\$0.65	\$0.55
$\frac{1}{2}$	2.00	1.00	3.00	2.50	.70	.60
1	2.50	1.25	3.75	3.00	.80	.70
$1\frac{1}{2}$	3.50	1.50	4.75	3.75	1.00	.80
2	5.00	2.00	6.50	4.50	1.25	1.00
3	6.50	3.00	10.00	7.00	1.75	1.50

D 2530. WESTON'S GEARED DIFFERENTIAL BLOCKS.

One man can lift from 2,000 to 5,000 pounds.

Gardner
Die Head
Cuts
Accurate
Threads.



Capacity. Tons.	Main Chain in Blocks of Regular Lift. Feet.	Hand Chain in Blocks of Regular Lift. Feet.	Will Lift. Feet.	Weight, Each. Pounds.	Price, Each.	Extra Main Chain. Per foot
1	22	16	8	62	\$35.00	\$0.40
2	24	18	9	109	45.00	.44
3	26	20	10	159	60.00	.48
4	28	22	11	257	80.00	.54
5	30	24	12	324	110.00	.60
6	32	26	13	493	150.00	.70
8	36	28	14	735	210.00	.85
10	40	30	15	1054	275.00	1.00

The length of Lift Chain is twice the height of Lift, plus 6 feet.

The length of Hand Chain required is twice the height of Lift.

PARTS OF GEARED WESTON BLOCKS.

Capacity. Tons.	Top Sheave. Each.	Bottom Sheave. Each.	Hand Wheel. Each.	Capacity. Tons.	Top Sheave. Each.	Bottom Sheave. Each.	Hand Wheel. Each.
1	\$3.00	\$1.25	\$1.00	5	\$11.00	\$4.50	\$4.00
2	3.75	1.75	1.00	6	14.00	6.50	4.00
3	5.00	2.50	2.00	8	22.00	9.00	5.00
4	8.00	3.50	3.00	10	30.00	12.00	5.00

D 2531.**BATT'S DIFFERENTIAL BLOCKS.**

Capacity. Tons.	Will Lift Feet.	Weight Complete. Pounds.	Price, Complete.	Extra Chain, Per Foot.	Extra Hand Chain. Double, Per Foot.
$\frac{1}{4}$	8	34	\$ 18.00	\$0.25	\$0.25
$\frac{1}{2}$	8	44	21.00	.30	.25
1	8	59	25.00	.35	.25
$1\frac{1}{2}$	8	88	30.00	.45	.25
2	9	128	45.00	.55	.25
3	10	145	60.00	.90	.25
4	10	189	80.00	1.10	.25
6	12	335	125.00	1.50	.25

D 2537.

WESTON TRIPLEX BLOCKS.

This block has an actual efficiency of 79 per cent. The cut shows the style of block of two tons or greater capacity. Blocks of lesser capacity have no foot blocks.



Capacity. Tons.	Will Lift. Feet.	Weight Complete. Pounds.	Price. Each.	Extra Hoist. First Foot	Extra Hoist. Each Addi- tional Foot.
$\frac{1}{2}$	8	55	\$30.00	\$1.90	\$1.20
1	8	90	40.00	2.05	1.30
$1\frac{1}{2}$	8	120	50.00	2.25	1.40
2	9	150	60.00	2.50	1.50
3	10	206	80.00	2.80	1.70
4	10	307	100.00	3.15	1.95
5	12	397	125.00	3.60	2.25
6	12	417	150.00	4.15	2.60
8	12	505	180.00	4.80	3.00
10	12	622	225.00	5.50	3.45

PARTS OF TRIPLEX BLOCKS—TWO TONS AND LESS CAPACITY.

Capac- ity. Tons.	Internal Gear. Each.	Load Chain, Sheave and Pin- ion Cogs. Price, Together.	Internal Gear Cover. Each.	Ratchet Case. Each.	Hand Chain Wheel. Each.	Driving Pin- ion, Nut and Cotter. Each.
$\frac{1}{2}$	\$2.00	\$2.85	\$1.50	\$2.20	\$2.00	\$2.50
1	2.75	3.60	2.25	3.00	3.00	3.40
$1\frac{1}{2}$	4.25	5.65	3.20	3.85	3.75	4.35
2	5.25	7.25	4.10	4.75	4.50	5.00

PARTS OF TRIPLEX BLOCKS—OVER TWO TONS CAPACITY.

Capacity. Tons.	Yoke, Crossh'd, Pin & Ch'in Bolt. Price, Together.	Top Yoke Complete. Each.	Upper Sheave. Each.	Lower Sheave. Each.
3	\$ 8.73	\$12.00	.....	\$2.82
4	11.28	15.50	.....	3.21
5	12.20	24.00	\$2.00	3.86
6	17.91	35.25	2.95	4.47
8	20.31	48.00	3.65	2 for 7.63
10	26.25	64.00	2 for 8.00	2 for 8.36

D 2538.

THE "KING" CHAIN BLOCKS.

(Luder's patent.) Has patent Automatic Friction Brake. Ten Sizes. To lift from 1,000 to 20,000 pounds. No. 10 is furnished with Flat Link Chain.

PRICE LIST.

No.	Capacity.	Lift.	Price.	Weight, including Chain.	Parallel Clamps Hold Work True.
1	1,000 lbs.	9 feet.	\$25.00	50 lbs.	
2	2,000 "	9 "	30.00	72 "	
3	3,000 "	9 "	40.00	97 "	
4	4,000 "	9 "	55.00	130 "	
5	6,000 "	9 "	75.00	165 "	
6	8,000 "	9 "	95.00	215 "	
7	10,000 "	12 "	140.00	260 "	
8	12,000 "	12 "	180.00	312 "	
9	16,000 "	12 "	260.00	418 "	
10	20,000 "	12 "	340.00	530 "	

D 2539. SURE GRIP STEEL TACKLE BLOCK.

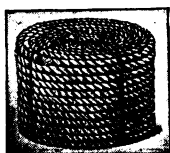
Will hold a load at any point without fastening the rope. The wedge-shaped brake has a double grip and is absolutely automatic and reliable. The heavier the load the better the grip.

No. 3, for $\frac{3}{8}$ in. rope,	capacity 600 lbs.	1 man can lift 300 lbs.	\$3.00
" 4, " $\frac{1}{2}$ "	" 1,000 "	" 350 "	5.50
" 5, " $\frac{5}{8}$ "	" 1,800 "	" 400 "	7.00
" 6, " $\frac{3}{4}$ "	" 2,500 "	" 450 "	8.50
" $4\frac{1}{2}$ ", " $\frac{1}{2}$ "	" 3,000 "	" 600 "	10.00
" $5\frac{1}{2}$ ", " $\frac{5}{8}$ "	" 3,500 "	" 700 "	12.00
" $6\frac{1}{2}$ ", " $\frac{3}{4}$ "	" 5,000 "	" 850 "	14.00

Price of rope, extra.

D 2544.

MANILLA ROPE.



Size in diameter, inches.....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{8}$
Weight of 100 feet, lbs.....	3	4	5½	7
Strength new rope, lbs.....	450	750	900	1250
Size in diameter, inches.....	1¾	1½	1¼	1½
Weight of 100 feet, lbs.....	54	62	67	84
Strength new rope, lbs.....	13500	15500	17000	19900

Size in diameter, inches	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	1½	1¾	1½	1¾
Weight of 100 feet, lbs..	8	11	15	17	21	25	33	36	42
Strength new rope, lbs.	1700	2300	3000	4000	5000	5800	7000	8000	9200
Weight of 100 feet, lbs..	100	120	142	170	192	217	243	276	350
Strength new rope, lbs.	23500	29300	37000	42000	48000	54000	61000	67000	96000

Per pound, all sizes, \$0.20. A very large stock of all sizes always on hand. Hawser Laid Manilla Rope for oil and artesian well use.

Tallow Laid Manilla Rope laid up in three and four strands. We guarantee all our Manilla Rope to be made out of pure Manilla Hemp of the best quality.



D 2545.

JACK SCREWS.

Gardner
Grinder
for Flat
Grinding.

Levers will be sent only when ordered, and will be charged extra.

Diam. of Screw Inch.	H'ght of Stand Inch.	Height Over All. Inch.	Lifting Cap'city Tons.	Price, Each.	Diam. of Screw Inch.	H'ght of Stand Inch.	Height Over All. Inch.	Lifting Cap'city Tons.	Price, Each.
1½	6	9	8	\$ 2.90	2	18	22½	20	\$10.25
1½	8	11	8	3.25	2	20	24½	20	11.45
1½	10	13	8	3.60	2	22	26½	20	12.50
1½	12	15	8	4.00	2	24	28½	20	13.50
1½	14	17	8	4.40	2¼	8	13	24	7.50
1¼	6	9	10	3.10	2¼	10	15	24	8.25
1¼	8	11	10	3.40	2¼	12	17	24	9.00
1¼	10	13	10	3.80	2¼	14	19	24	10.00
1¼	12	15	10	4.20	2¼	16	21	24	11.00
1¼	14	17	10	4.60	2¼	18	23	24	12.00
1½	5	8	12	3.50	2¼	20	25	24	13.25
1½	6	10	12	3.75	2¼	22	27	24	14.50
1½	8	12	12	4.25	2¼	24	29	24	15.75
1½	10	14	12	4.75	2½	6½	11	28	8.00
1½	12	16	12	5.25	2½	8	14	28	8.75
1½	14	18	12	6.00	2½	10	16	28	9.75
1½	16	20	12	6.75	2½	12	18	28	10.75
1¾	6	10	16	4.50	2½	14	20	28	12.00
1¾	8	12	16	5.00	2½	16	22	28	13.25
1¾	10	14	16	5.75	2½	18	24	28	14.50
1¾	12	16	16	6.25	2½	20	26	28	15.75
1¾	14	18	16	6.75	2½	22	28	28	17.00
1¾	16	20	16	7.50	2½	24	30	28	18.25
1¾	18	22	16	8.50	2½	28	34	28	22.00
2	5	9½	20	5.00	2½	32	38	28	26.00
2	6	10½	20	5.25	3	14	20	36	19.50
2	8	12½	20	6.00	3	16	22	36	20.75
2	10	14½	20	6.75	3	18	24	36	22.00
2	12	16½	20	7.50	3	20	26	36	23.25
2	14	18½	20	8.25	3	22	28	36	24.50
2	16	20½	20	9.25	3	24	30	36	25.75



PECORA MACHINERY PAINTS.

We are the Western representatives and carry a complete stock of the celebrated Pecora Machinery Paints, which have been on the market and given excellent satisfaction since 1862.

D 2551. FLAT STEEL COLOR.

In paste form only, for Engines, Tools and General Machinery. Dries with a flat surface, preserves the work, dries quick and hard, gives a smooth and hard finish. Four Standard shades. Uniform in shade. Send for Color Card.

D 2552. EGG SHELL GLOSS ENAMEL.

Used strictly as a Finishing Paint for Engines, Tools and General Machinery. Dust proof in 10 minutes. Dries hard in 30 minutes. Sold only in liquid form.

DESCRIPTION.—Small castings or parts of machinery can be dipped in it, and will run off and look better than when the enamel is applied with a brush. Unlike flat steel color, grease can be wiped off its surface without leaving a spot. Egg Shell Gloss Enamel will not show the imperfections in a casting as in the case of high glossed surfaces where varnish or gloss paints are used.

This enamel, as the name indicates, dries with a finish like that on an egg—a semi-gloss or soft satin finish. It dries free from dust in ten minutes; that is, after the work is coated that length of time, any dust which may settle on it will not adhere to its surface, but can be dusted off, leaving a clean and semi-polished surface. It dries hard in thirty minutes to two hours, so that a machine can be handled without defacing the enameled surface. Send for Color Card.

D 2553. DRESDEN MACHINE ENAMEL.

Imparts a rich glossy appearance. Entirely dispenses with varnish. For Radiators, Steam Pipes, Tanks, Engines, Tools and General Machinery. Dust proof in 1 hour. Dries hard in 8 hours. Send for Color Card.

D 2554. IRON FILLER.

For making rough castings smooth, filling all irregularities and giving a smooth, level and even surface on which to apply our finishing paints. Sold in paste form only. Full directions sent on application.

PRICES OF PECORA MACHINERY PAINTS.



D 2555. STEEL COLOR PAINT.

	Per lb.
25 lb. Cans (6 to a case) ..	\$0.05
100 " Kegs .....	.04½
Bbls. and ½ bbls. ....	.04

D 2556. DRESDEN MACHINE ENAMEL

	Per gal.
1 gal. Cans (8 to a case)	\$1.85
5 and 10 gal. Buckets	1.75

D 2557. EGG SHELL GLOSS.

	Per gal.
1 gal. Cans (8 to a case)	\$1.85
5 and 10 gal. Buckets	1.75

D 2558. IRON FILLER.

	Per gal.
1 gal. Cans	\$1.85
5 and 10 gal. Buckets	1.25
Bbls. and ½ bbls.	1.00

Bbls. and ½ bbls.

D 2559. PAINT THINNER.

	Per gal.
5 and 10 gal. Cans	\$0.55
½ Bbls. and 25 gals .....	.45
Bbls. and 50 gals .....	.40

D 2560. MANNOCITIN.

The Only Absolute Rust Preventive.

For Machinery, Engines, Tools, Guns, Cycles and all Metals. Mannocitin withstands salt air, salt water, rain, snow, dampness, perspiration, steam, gases and fumes of acids and ammonia.

Mannocitin is composed of greases and volatile oils. It is, and remains, absolutely neutral, and contains no acid. On application the oils evaporate, leaving an air-tight film or skin, which adheres tightly to the metal and absolutely and permanently prevents rust and corrosion.

Bonanza
Oil Cups
are Good.

MANNOCITIN—(CONTINUED).

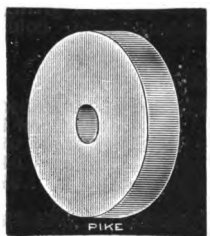


as compared, for instance, with white lead. The Mannocitin coating will stand very high temperature without melting, and it can therefore be used to advantage on bright parts of boilers, etc. An article once coated with Mannocitin is protected as long as the film is allowed to remain on, consequently it prevents rust for years.

Mannocitin covers about four times more surface than any other rust-preventive, one gallon being sufficient to protect a surface of 1100 square feet; it is therefore cheaper than other compounds. It is applied with a rag or a soft brush, and if desired, articles may be coated by dipping them into the compound. Mannocitin is adapted for use on the largest engines, as well as on the finest tools, guns, moulds, engravers' plates, etc.,

Pint Cans, each, \$0.60	1 gal. Cans, each, \$3.00	15½ gal. Kegs, per gal. \$2.65
Quart " " 1.00	2½ " " per gal. 2.85	31 gal. ½ Bbl., " 2.50
½ gal. " " 1.75	5 " " " 2.75	50 " 1 " " 2.50

Send 10 cents in stamps for sample package. Write for booklet on Mannocitin.



GENUINE ARKANSAS AND WASHITA OIL STONES.

D 2566. WHEELS.

Wheels 1½ to 4 in. diam., ¼ to ½ in. thick, ¼ to ½ in. hole. Price per in., Arkansas, \$2.00; Washita, \$1.00. Smaller or larger sizes, special price.



D 2567.

ROUND EDGE SLIPS.

About 3 to 5x1¼ to 2x ¾ to ¾ back, x ⅛ to ¾ inch edge.

Arkansas, per lb....	\$4.00
" each.....	.65
Washita, per lb.....	2.50
" each.....	.30



D 2568. KNIFE BLADE SLIPS.

3 in. to 4½x¾ in. to 1x½ to ¼ in. back; sharp edge. Each, Arkansas, \$0.50; Washita, \$0.25.



D 2569. Triangulars.

D 2569 and 2570. 3 to 5 in. long. Each:

Arkansas.....	\$0.50
Washita.....	.25

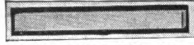


D 2570. Diamond-Shape File Slip.



D 2571. Pencil Points.

D 2571, D 2572, D 2573. About 3 in. long. Ea., Arkansas, \$0.40; Washita, \$0.20.



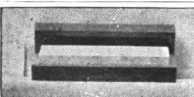
D 2572. Flat File Slips.



D 2573. Penknife Pieces.

D 2574. ROUND FILE SLIPS.

About 3 inches long. Each, Arkansas, \$0.80; Washita, \$0.40.

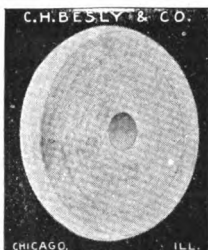


D 2575.

MOUNTED STONES, IN POLISHED MAHOGANY BOXES.

	Inches 3½x1	4x1½	5x2	6x2	7x2	8x2
Arkansas, per dozen.....	\$9.00	14.00	24.00	30.00	36.00	40.00
" each.....	.90	1.40	2.40	3.00	3.60	4.00
Washita, per dozen.....	4.50	7.00	12.00	15.00	18.00	20.00
" each.....	.45	.70	1.20	1.50	1.80	2.00
Arkansas, 4x1 inches on mahogany handles.....per doz.,	\$ 7.00	Each, \$0.70				
Arkansas, 3½ inch, in vulcanized rubber case....	" 12.00	" 1.20				
Arkansas Unmounted Stones, per lb., 3 to 5½ inch, \$2.80;	5½ to 8 inch, \$3.50					
Washita " " " " " " " "	.60;					

Dies,
Special
Shapes
and
Threads
Made to
Order.



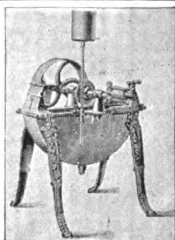
D 2581. GRINDSTONES.

We are prepared to furnish GRINDSTONES for all purposes.

Mounted Grindstones for hand and POWER USE.

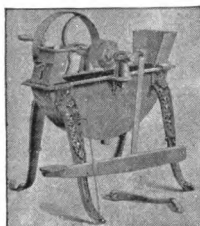
Send us list of sizes in stones required and class of work to be ground and we will name you satisfactory prices.

All stones over 200 pounds are sold by measurement weight, less than 200 pounds by cut weight, which is actual weight on scales as they come from the lathe and is always cut on the stone.



D 2582.

IRON
GRINDSTONE
FRAMES.



D 2583.

Dies,
Special
Shapes
and
Threads,
Made to
Order.

D 2582. WITH ADJUSTABLE TOOL REST. TRUING ATTACHMENT AND WATER POT.

Takes stone 30 inches in diameter and 4 inch face.

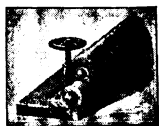
Price, complete.....\$18.00 | Price, without water pot.....\$17.00

D 2583. WITH WATER GUARD AND ADJUSTABLE TOOL REST.

Takes stone 30 inches in diameter and 4 inch face.

Price, without pulley or treadle attachment, \$12.00. Pulley, extra, \$1.50.
Treadle, \$1.50. Pulley has removable handle attached, as shown in cut.

D 2584. GRINDSTONE TRUING DEVICE.



One of the most disagreeable things to be done in a workshop is the truing of grindstones. It is, therefore, often the case that they are allowed to become quite out of shape and untrue, very much to the annoyance of the workman, who finds it almost impossible to grind his tools in a proper manner. The cut illustrates a device which is well adapted for truing and keeping the face of grindstones constantly in good

shape. This can be instantly applied to the face of the stone, working automatically, and without dust, keeping the face always in good shape, without interfering with its constant use.

DIRECTIONS.—The main stand or bottom piece is securely clamped upon the trough, close to the face of the stone; then by turning the hand wheel, the threaded roll is brought into contact with the face of the stone, and is allowed to remain as long as is requisite to produce the desired result. The water is to be left as usual in the trough. When by long use the thread on the hardened roll becomes worn, it can be re-cut, which operation may be repeated. *The stone should revolve so as to have the device upon the face which moves upward, and the device should be well oiled before it is used.*

The device should not be used on stones revolving at a greater surface speed than about 500 or 550 feet per minute.

Price, with 7-inch roll.....\$13.00	Price of 7-inch roll.....\$6.00
Price, with 12-inch roll..... 17.00	Price of 12-inch roll..... 8.00

D 2585. THE GARDNER GRINDSTONE TRUING DEVICE.



The stone may be trued while running in water, thus no dust is raised. A heavy cut may be taken off the stone as quickly as a light cut. If the stone is out of true $\frac{1}{4}$ inch to $\frac{1}{2}$ inch it can be made true by running a cutter once over the stone.

It takes about five or six minutes to true up a stone in good shape.

One cut across the face is generally sufficient, leaving the stone in excellent condition for grinding.

This machine will turn off a stone with 7-inch face. We can make them for stones of wider face. Would be pleased to quote prices on application.

Extra Rolls or Cutters, each\$1.50



D 2591.

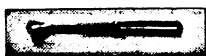
EMERY WHEELS.

We can furnish either wire webbed or vitrified wheels. State in order which you prefer.

Diameter in Inches.	THICKNESS OF WHEELS IN INCHES.								Revolutions per Minute.
	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	
1	\$0.25	\$0.30	\$0.30	\$0.35	\$ 0.35	\$ 0.40	\$ 0.45	\$ 0.50	18,000
1 $\frac{1}{2}$	.30	.35	.40	.45	.45	.50	.55	.60	14,000
2	.35	.45	.50	.55	.55	.60	.65	.70	10,000
2 $\frac{1}{2}$	.40	.55	.65	.70	.75	.85	.95	1.05	8,500
3	.50	.65	.80	.90	.95	1.10	1.25	1.40	7,000
3 $\frac{1}{2}$	.60	.80	.95	1.05	1.15	1.35	1.55	1.75	6,035
4	.75	.95	1.10	1.25	1.35	1.60	1.85	2.10	5,300
4 $\frac{1}{2}$	.90	1.10	1.25	1.40	1.55	1.85	2.15	2.45	4,700
5	1.00	1.20	1.40	1.60	1.80	2.20	2.60	3.00	4,200
6	1.40	1.60	1.75	2.10	2.40	3.05	3.70	4.35	3,500
7	1.85	2.00	2.15	2.60	3.00	3.85	4.70	5.55	3,000
8	2.10	2.35	2.60	3.10	3.60	4.60	5.60	6.60	2,600
9	2.50	2.80	3.10	3.70	4.25	5.40	6.55	7.70	2,300
10	3.00	3.35	3.65	4.35	5.00	5.35	7.70	9.05	2,100
12	3.60	3.80	4.00	5.00	6.00	7.40	9.00	10.70	1,750
14	4.05	5.15	6.25	7.35	8.45	10.60	12.85	15.05	1,500
16					10.85	13.70	16.55	19.40	1,300
18					13.25	17.00	20.75	24.50	1,150
20						20.25	24.75	29.25	1,050
22						25.00	31.00	37.00	950
24						29.00	36.00	43.00	850
26							43.00	51.00	775
30								61.00	705
36								95.00	520

Diameter in Inches.	THICKNESS OF WHEELS IN INCHES.								Revolutions per Minute.
	1 $\frac{1}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	4	
1	\$ 0.55	\$ 0.60	\$ 0.65	\$ 0.70	\$ 0.75	\$ 0.80	\$00.90	\$ 1.00	18,000
1 $\frac{1}{2}$	.65	.70	.75	.80	.85	.90	1.00	1.10	14,000
2	.75	.80	.85	.90	.95	1.00	1.10	1.20	10,000
2 $\frac{1}{2}$	1.15	1.25	1.35	1.45	1.55	1.65	1.85	2.05	8,500
3	1.55	1.70	1.85	2.00	2.15	2.30	2.60	2.90	7,000
3 $\frac{1}{2}$	1.95	2.15	2.35	2.55	2.75	2.95	3.35	3.75	6,035
4	2.35	2.60	2.85	3.10	3.35	3.60	4.10	4.60	5,300
4 $\frac{1}{2}$	2.75	3.05	3.35	3.65	3.95	4.25	4.85	5.45	4,700
5	3.40	3.80	4.20	4.60	5.00	5.40	6.20	7.00	4,200
6	5.00	5.65	6.30	6.95	7.60	8.25	9.55	10.85	3,500
7	6.40	7.25	8.10	8.95	9.80	10.65	12.35	14.05	3,000
8	7.60	8.60	9.60	10.60	11.60	12.60	14.60	16.60	2,600
9	8.85	10.00	11.15	12.30	13.45	14.60	16.90	19.20	2,300
10	10.40	11.75	13.10	14.45	15.80	17.15	19.85	22.55	2,100
12	12.75	14.00	15.70	17.40	19.00	20.75	24.25	27.50	1,750
14	17.25	19.45	21.65	23.85	26.05	28.25	32.62	37.05	1,500
16	22.28	25.00	27.95	30.80	33.65	36.50	42.20	47.90	1,300
18	28.25	32.00	35.75	39.50	43.25	47.00	54.50	62.00	1,150
20	33.75	38.25	42.75	47.25	51.75	56.25	65.25	74.25	1,050
22	43.00	49.00	55.00	61.00	67.00	73.00	85.00	97.00	950
24	50.00	57.00	64.00	71.00	78.00	85.00	99.00	113.00	850
26	59.00	67.00	75.00	83.00	91.00	99.00	115.00	131.00	775
30	72.00	83.00	94.00	105.00	116.00	127.00	149.00	171.00	705
36	110.50	126.00	141.50	157.00	172.50	188.00	219.00	250.00	520

D 2592.

THE HUNTINGTON EMERY WHEEL DRESSER.—(Improved.)

For truing, shaping, sharpening and removing glaze from solid emery wheels running at full speed. Patent emery wheel dresser (2 sets cutters)...\$2.50
Extra cutters, per set, net..... .25

D 2593.

DIAMONDS AND HOLDERS.**For Truing Emery Wheels.**

Diamonds mounted in hand tools.

Each, \$8.00 to \$50.00.

Helme
Bronze
Makes
Stiff
Spring



D 2594.

DIAMONDS.

Mounted in hand or lathe tools. Each, \$15.00 to \$50.00.

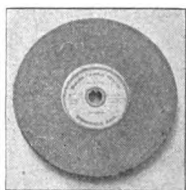


D 2595.

DIAMONDS.

Mounted in adjustable lathe tools. Each, \$15.00 to \$50.00.

D 2601. THE CELLULOID EMERY WHEELS



Are made from 1-64 inch up to any thickness, and in any shape. They are not affected by water or acid, being of a plastic nature. Can be run at very high speed with absolute safety.

We make Wheels 1-32 inch thick any size to 6 inch diameter; 1-16 inch thick any size to 12 inch diameter; 1-8 inch thick any size to 24 inch diameter, and any intermediate size ordered. All wheels less than 1-4 inch thick at list prices of 1-4 inch Wheels.

Wheels less than 1-4 inch thickness subject to the same discount as below black mark.

Taps and Dies Made to Any Degree of Accuracy.

PRICE LIST OF CELLULOID EMERY AND CORUNDUM WHEELS.

Diam. in inches.	THICKNESS OF WHEELS IN INCHES.																Revolts per min.
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4			
3/4	\$0.25	\$0.30	\$0.35	\$0.38	\$0.40	\$0.43	\$0.45	\$0.50	\$0.55	\$0.65	\$0.75	\$0.90	\$1.00	\$1.15			....
1	.25	.30	.35	.38	.40	.43	.45	.50	.55	.65	.75	.90	1.00	1.15			....
1 1/2	.25	.30	.35	.38	.40	.43	.45	.50	.55	.65	.75	.90	1.00	1.15			....
2	.32	.39	.45	.48	.50	.53	.55	.60	.65	.80	.95	1.15	1.30	1.50			....
2 1/2	.45	.55	.65	.68	.70	.73	.75	.82	.90	1.15	1.40	1.65	1.90	2.15			....
3	.55	.65	.75	.83	.90	.98	1.03	1.15	1.25	1.50	1.80	2.15	2.55	2.85	7400		
3 1/2	.65	.78	.90	.98	1.07	1.16	1.25	1.45	1.65	1.95	2.45	2.90	3.30	3.75	6425		
4	.75	.88	1.00	1.13	1.25	1.38	1.50	1.75	2.00	2.50	3.05	3.60	4.20	4.75	5450		
5	.95	1.10	1.25	1.41	1.57	1.74	1.90	2.30	2.70	3.45	4.30	5.15	6.00	6.90	4400		
6	1.15	1.35	1.55	1.85	2.15	2.45	2.75	3.40	4.05	5.05	6.30	7.55	8.80	10.00	3600		
7	1.50	1.75	2.00	2.40	2.80	3.20	3.60	4.50	5.00	6.50	8.00	9.50	11.00	12.50	3150		
8	1.75	2.05	2.35	2.78	3.20	3.63	4.05	4.95	5.85	7.65	9.45	11.25	13.25	15.00	2750		
9	2.15	2.50	2.85	3.43	4.00	4.50	5.00	6.00	7.20	9.00	11.50	13.70	16.00	18.20	2450		
10	2.50	2.88	3.25	3.95	4.65	5.33	6.00	7.20	8.50	11.00	13.50	16.20	18.90	21.40	2200		
12	2.70	3.15	3.60	4.39	5.17	5.96	6.75	8.32	9.90	12.60	15.75	18.90	22.00	25.25	1850		
14	4.20	4.90	5.60	6.73	7.85	8.98	10.10	12.05	14.00	17.50	22.00	26.50	31.00	35.00	1600		
16	5.40	6.20	7.00	8.50	10.00	11.50	13.00	15.25	17.50	22.00	28.50	33.50	37.00	45.00	1400		
18	6.30	7.40	8.50	10.38	12.25	14.13	16.00	19.00	22.00	29.00	36.00	43.00	50.00	57.00	1250		
20	7.00	8.50	10.00	12.25	14.50	16.75	19.00	22.50	26.00	35.00	44.00	52.00	61.00	70.00	1100		
22	9.00	10.50	12.00	14.50	17.00	19.50	22.00	26.00	31.00	42.00	53.00	63.00	74.00	84.00	1000		
24	10.01	12.00	14.00	17.00	20.00	23.00	26.00	32.00	38.00	50.00	63.00	75.00	88.00	100.00	925		



D 2602. Polishing Lathe Head, No. 1.

POLISHING LATHES AND LATHE HEADS.



D 2603. Polishing Lathe Head, No. 2.



D 2604. Polishing Lathe, No. 2.

POLISHING LATHE HEADS.

All our Polishing Heads have steel arbors running in adjustable bearings. Pulleys flat or grooved. Stand nicely japanned.

No. 1, Length of Spindle 8 inches.	Price.....	\$1.50
No. 2, " " " 9 1/2 "	"	2.00
No. 3, " " " 12 "	"	5.00
No. 4, " " " 18 "	"	9.00
Countershafts for either of above Heads.....		5.00

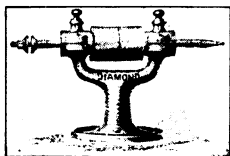
D 2605.

POLISHING LATHES.

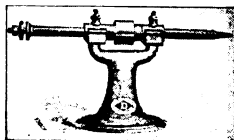
Number {	1	2	3	4	4	4
				Without Head	Small Head	Large Head
D 2605. Price, each.....	\$5.50	\$8.00	\$11.00	\$20.00	\$24.00	\$27.00
Hand Rest for No. 3. Extra.....						\$2.00

POLISHING LATHE No. 4.—This Lathe is made entirely out of iron and steel. Top is cast in one piece, with collars around belt holes. Is provided with hole and pan in one corner to collect sweeps. Driving Wheel is 24 inches. Height in front, 40 inches.

DIAMOND POLISHING and GRINDING MACHINERY.

**D 2611. No. 0 Polishing Lathe.**

Price, with Single Pulley\$7.00
 Price, with Double Pulley 8.50

**POLISHING
LATHES.****D 2612. No. 1 Polishing Lathe.**

Price, with Single Pulley.....\$10.00
 Price, with Double Pulley 12.00

Gardner
Opening
Die
Head
Cuts
Exact
Threads.

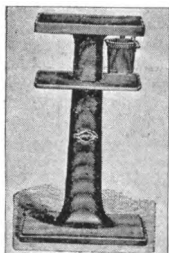
The Nos. 0 and 1 Polishing or Buffing Lathes have cast iron boxes 2 inches long, with caps milled to fit frame, and steel set screws for taking up the wear. They are made with tight and loose or single pulley. Dimensions of each machine are given below.

DIMENSIONS No. 0 POLISHING LATHE.

	in.
Size of Base	7x5
Height Base to center of Spindle..	5¼
Diameter of Spindle in Boxes....	¾
Diameter of Spindle betw'n Flanges	1½
Length of Spindle	14
Length of Bearings.....	2
Size of Pulley.....	2x1½
Weight.....	12 lbs.

DIMENSIONS No. 1 POLISHING LATHE.

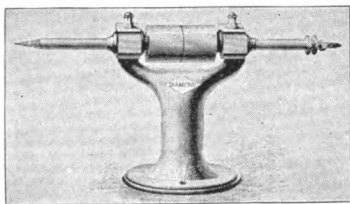
	in.
Size of Base	7x5
Height Base to center of Spindle..	7½
Diameter of Spindle in Boxes....	¾
Diameter Spindle betw'n Flanges..	1½
Length of Spindle	17
Length of Bearings.....	2
Size of Pulley.....	2x1½
Weight.....	15 lbs.

**D 2613. IRON COLUMN WITH WATER POT.****For Mounting Polishing Machines Nos. 0 and 1.**

The Iron Column with Table shown is designed to be used with Polishing Machines Nos. 0 and 1; it is more economical for such purposes than any temporary arrangement. A water pot is attached to the column as a fixture, for the ready convenience of cooling the work when desired; this is an invention of ours which will be found of practical service. When water pot is not in use it can be swung under the table.

Size of Iron Table	16x10 inches.
Size of Base of Column.....	16x13 "
Height from floor.....	30 "
Weight of Column.....	100 pounds.

Price of Column with Water Pot.....\$10.00

D 2614. POLISHING OR BUFFING LATHE, No. 1 1-2.

This machine can be furnished with single, tight and loose, or cone pulley, has steel spindle, hardened steel cap screws, and patent oil cups. A taper attachment is provided which screws into the end of the spindle; a small arbor for small emery or buff wheels is also made to fit where the taper screw is used. Prices

given do not include the small arbor, which is \$2.50 extra.

DIMENSIONS.

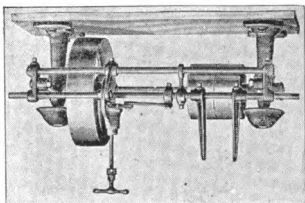
	in.		in.
Size of Base	10x8	Length of Spindle.....	24
Height Base to center of Spindle..	10	Size of Single Pulley.....	3x3
Diameter of Spindle in Boxes....	1	Size of Cone Pulley.....	2½ & 3½ x 2½
Diameter Spindle betw'n Flanges. ¾		Length of Cast Iron Bearings....	4
Weight.....	50 pounds.		

Prices with Spindles shown on page 240 including one Taper Attachment:

A Single Pulley.....	\$15.00	F Tight and Loose Pulley.....	\$22.50
B Single Pulley.....	17.50	G Cone Pulley.....	20.00
C Single Pulley.....	20.00	H Cone Pulley.....	22.50
D Tight and Loose Pulley.....	17.50	I Cone Pulley.....	25.00
E Tight and Loose Pulley.....	20.00		

Column shown on page 239 is used with this machine.

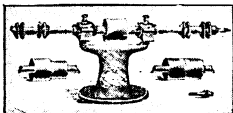
D 2620.

REGULAR COUNTERSHAFT No. 1.**For Nos. 1 1-2 and 2 Polishing Machines.**

The drop of hangers shown is 7 inches; diameter of tight and loose pulleys, 6 inches, $2\frac{3}{4}$ -inch face. Diameter of driving pulley, 12 inches; width of face, 3 inches. Entire length of shaft, 28 inches. Diameter of shaft, 1 inch. The patent belt shifter attachment involves the same principle as that on our patent countershaft. It can be applied to any countershaft, large or small, or any place where it is required to shift a belt

from tight to loose pulley. It can be adjusted to fit any drop or hanger. It can be used for any width of belt. It works well on friction pulleys for lathes. The belt cannot work off from one pulley on to the other without turning the handle. It brings no shock or blow on the hanger like old style shifter handle. Price with single driving pulley and patent belt shifter.....\$15.00
 Price with single driving pulley without patent belt shifter..... 12.50
 Price of No. 1 Regular Countershaft with cone driving pulley..... 17.50
 Price of belt shifter attachment alone, applied to any countershaft..... 3.00

D 2621.

No. 2 POLISHING OR BUFFING LATHE.**Cast Iron or Babbitt Boxes (See Page 240.)**

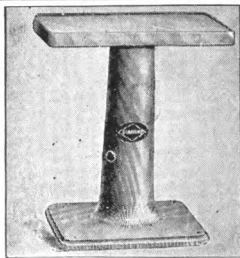
This machine can be furnished with single, tight and loose, or cone pulley, has hardened steel cap screws, and patent oil cups. One taper attachment is provided which screws into the end of the spindle; a small arbor for emery or buff wheels is also made to fit where

the taper screw is used. Prices given for No. 2 Polishing Heads and Spindles do not include the small arbor, which is \$2.50 EXTRA. Taper point in both ends, \$0.75 EXTRA.

Size of Base.....	12x9 in.	Length of Spindle.....	36 in.
Height Base to cent. of Spindle.....	12 "	Size of Single Pulley.....	4x4 "
Diameter of Spindle in Boxes.....	$1\frac{1}{4}$ "	Size of Cone Pulley.....	$3\frac{1}{2}$ x $4\frac{1}{2}$ x $3\frac{1}{2}$ "
Diam. of Spindle bet. Flanges.....	1 "	Length of cast iron Bearings.....	4 "
Weight.....	75 pounds.		

Price with Spindle shown, "C," single pulley, cast iron boxes... ("2 C") \$25.00
 Price with Spindle "F," tight and loose pulley, cast iron boxes... ("2 F") 27.50
 Price with Spindle "I," cone pulley, cast iron boxes... ("2 I") 30.00

For prices No. 2 Polishing Head with other styles of steel spindles see page 240. Countershaft used with this machine is shown above.



D 2622.

IRON COLUMN WITH IRON TABLE.

Malleable
Thumb
Screws
Carried in
Stock.

Used for Mounting Nos. 1 1-2 and 2 Polishing or Buffing Lathe.

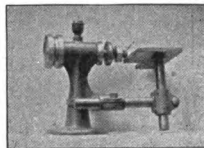
The column stands 26 inches from base to top; size of iron table is 25x14; weight of column, 160 pounds. Our machines are fitted to this column when ordered.

Price of Iron Column, with or without table, \$15.00.

**BRADY POLISHING HEAD.**

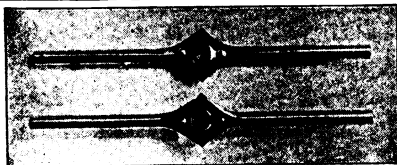
D 2623. No. 00. Swings
inch wheel.....each \$5.00

D 2624. No. 0. Same as
above with Rest...each 7.50



D 2623. No 00.

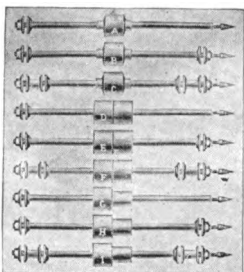
D 2624. No. 0.



D 2625.

BADGER DIE STOCKS FOR BICYCLE USE.

For price, see page 51.

D 2630. STEEL SPINDLES USED IN DIAMOND POLISHING OR BUFFING HEADS, Nos. 1½, 2, 3, 4 and 7.

DIMENSIONS OF SPINDLES FOR NO. 2 MACHINE.—These Spindles are made of steel, with all collars turned perfectly true, square thread, nuts milled and squared up. For No. 2 machines they are made 36 inches long, diameter between flanges is 1 inch, and in boxes 1½ inch; diameters of single or tight and loose pulleys are 4 inches; of cone pulleys, 3½ and 4½ inches; they will run belts 3 inches wide. For other lathes the sizes, of course, are different. One end of the Spindle is drilled and tapped to receive a taper screw which goes with all the buffing machines except Nos. 3, 4 and 7; we also make to use in the same place a small arbor with flanges, to carry small wheels.

Price of Arbor to run in end of Spindle,

for small wheels \$2.50

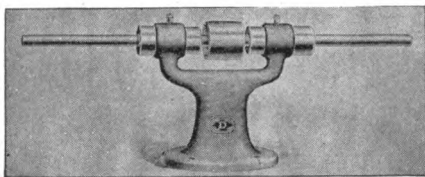
Price of Taper Attachment in both ends, extra75

Prices with No. 2 Head shown on page 239, CAST IRON BOXES, including one Taper Attachment:

A Single Pulley, \$20.00	D Tight and Loose Pulley, \$22.50	G Cone Pulley, \$25.00
B " " " 22.50	E " " " " 25.00	H " " " 27.50
C " " " 25.00	F " " " " 27.50	I " " " 30.00

Prices with No. 2 Head shown on page 239, BABBITT BOXES, including one Taper Attachment:

A Single Pulley, \$17.50	D Tight and Loose Pulley, \$20.00	G Cone Pulley, \$22.50
B " " " 20.00	E " " " " 22.50	H " " " 25.00
C " " " 22.50	F " " " " 25.00	I " " " 27.50

No. 2 POLISHING LATHE, SPECIAL.

D 2631. No. 2 Polishing Lathe, Special.

bearings consist of taper bronze bushings forced into the cast iron head. Hardened steel sleeves accurately ground are forced on the spindle and provision is made for expansion or heating and for perfectly adjusting the bearings for wear and end thrust. A ring oiling device furnishes an amply supply of oil. The bearings are fitted with our patent dust excluding device. The No. 2 machine has a No. 2 Morse taper in each end, but any of the spindles shown can be used. We also equip this Lathe with ball bearings as per the illustration below. The bearings are made of hardened steel, accurately ground, and the

This Lathe has been designed to meet the requirements of customers who desire a machine to run at high speed, to be self-adjusting for expansion and of great durability. We make this machine with either taper bearings or ball bearings as per the specifications below. The taper

balls are the best quality of steel ground to exact size. This bearing is specially designed to be used when the machine is run at a very high rate

D 2632. No. 2 Polishing Lathe with Ball Bearings.

of speed and has every adjustment for wear in all directions. We furnish the machine fitted with either of the above bearings for the prices named below. The dimensions are the same as for our regular No. 2 Polishing Lathe.

Price of Head only, as shown \$52.50

Price of Head only with Steel Spindles shown above:

A Single Pulley, \$47.50	D Tight and Loose Pulley, \$50.00	G Cone Pulley, \$52.50
B " " " 50.00	E " " " " 52.50	H " " " 55.00
C " " " 52.50	F " " " " 55.00	I " " " 57.50

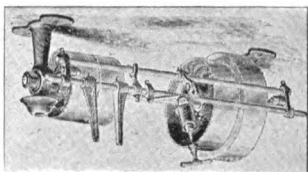
Price of Column (shown on page 245) with or without table \$15.00

Price of Countershaft Single Driving Pulley and Patent Belt Shifter 15.00

Price of Countershaft Cone Driving Pulley and Patent Belt Shifter 17.50

Malleable
Thumb
Nuts
Carried in
Stock.

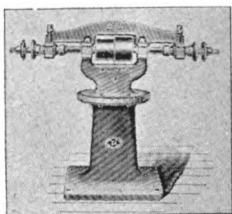
D 2638. REGULAR COUNTERSHAFT No. 2, FOR Nos. 3 AND 4 POLISHING MACHINE,



Is shown above, with HADLEY'S PATENT BELT SHIFTER attached. It has tight and loose pulleys, 8 inches in diameter, $4\frac{1}{4}$ inch face. Cone pulley, 15 and 16 inches diameter, $4\frac{1}{4}$ inch face, or single pulley, $20 \times 4\frac{1}{4}$ inches. The drop of hangers is 10 inches. Diameter of shaft, $1\frac{1}{8}$ inches. Entire length of shaft, 34 inches.

Price with Patent Belt Shifter attached as shown..... \$18.00
 Price without Patent Belt Shifter..... 16.00
 Price of Belt Shifter Attachment alone, applied to any Countershaft 3.00

D 2639. No. 3 POLISHING OR BUFFING LATHE.

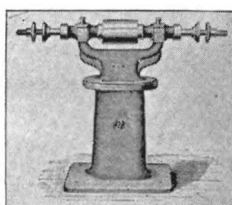


Cast Iron Engine Lathe Boxes. Patent dust protectors. Overhanging arm makes spindle very stiff for heavy work. Spindle 52 inches long, $1\frac{1}{4}$ inches between flanges.

A	Single Pulley.....	\$45.00
B	" "	50.00
C	" "	55.00
D	Tight and Loose Pulley.....	50.00
E	" " " "	55.00
F	" " " "	60.00
G	Cone Pulley.....	52.50
H	" "	57.50
I	" "	62.50

Column.....\$16.00 | Countershaft.....\$18.00
 Prices of Head shown with Spindles on page 240. No taper screw.

D 2640. No. 4 POLISHING OR BUFFING LATHE.

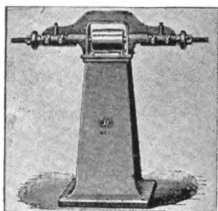


Cast Iron or Babbitt Boxes. Patent dust protectors. Long bearings. Wide belt used. Made for heavy work. Spindle 52 inches long, $1\frac{1}{4}$ inches between flanges.

A	Single Pulley.....	\$40.00
B	" "	45.00
C	" "	50.00
D	Tight and Loose Pulley.....	45.00
E	" " " "	50.00
F	" " " "	55.00
G	Cone Pulley.....	47.50
H	" "	52.50
I	" "	57.50

Column.....\$16.00 | Countershaft.....\$18.00
 Prices of Head shown with Spindles on page 240. No taper screw.

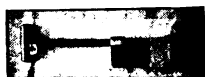
D 2641. No. 7 POLISHING OR BUFFING LATHE.



Long Babbitt bearings. Overhanging arm gives great stiffness. Can be belted from below. We make short column to be used on bench. Spindle 48 in. long, $1\frac{1}{4}$ in. between flanges.

A	Single Pulley.....	\$60.00
B	" "	65.00
C	" "	70.00
D	Tight and Loose Pulley.....	65.00
E	" " " "	70.00
F	" " " "	75.00
G	Cone Pulley.....	67.50
H	" "	72.50
I	" "	77.50

If on Bench Column, prices \$15.00 less | If without Countershaft....\$16.00 less
 Prices of Machine Complete with Countershaft and Spindles shown on page 240.

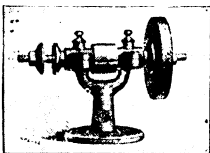


D 2642. STANWOOD IMPROVED PIPE CUTTER.

Number.....	1	2	3
Cuts Pipe, inches.....	$\frac{1}{2}$ to 1	$\frac{3}{4}$ to 2	2 to 3
Each.....	\$1.50	\$2.25	\$7.00
Extra Blocks and Wheels, each.....	.45	.60	1.25
Extra Wheels, each.....	.12	.18	.25
Pins, each.....	.05	.05	.08

D 2647. GRINDING MACHINE No. 1.

This machine will run two wheels up to six inches in diameter. It has steel spindle, and split boxes with set screws for taking up the wear. It can be furnished to belt from below.

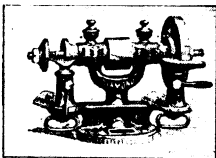


Diameter of Base.....	5 1/2 inches
Height Bench to Center Spindle.....	5 1/4 "
Length of Bearings.....	1 7/8 "
Diameter Spindle in Bearings.....	3/4 "
Diameter Spindle between Flanges.....	1 1/2 "
Size of Pulley on Spindle.....	2 x 1 1/2 "
Distance between Wheels.....	7 "
Weight of No. 1 Machine.....	10 pounds

Price of No. 1.....\$6.00 | No. 1 on Column with Countershaft...\$26.00

D 2648. GRINDING MACHINE No. 2.

This machine will run two wheels up to six inches in diameter. It has steel spindle with two rests having patented wrench permanently attached to each rest.

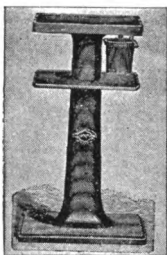


Diameter of Base.....	5 1/2 inches
Height Bench to Center Spindle.....	5 1/4 "
Length of Bearings.....	1 7/8 "
Diameter Spindle in Bearings.....	3/4 "
Diameter Spindle between Flanges.....	1 1/2 "
Size of Pulley on Spindle.....	2 x 1 1/2 "
Distance between Wheels.....	7 "
Weight of No. 2 Machine.....	16 pounds

Price of No. 2.....\$8.50 | No. 2 on Column with Countershaft...\$28.50

D 2649. IRON COLUMN WITH WATER POT.

For mounting Grinding Machines Nos. 1 and 2.



The Iron Column and Table shown is designed to use with Nos. 1 and 2 Grinding Machines; it is more economical for such purpose than any temporary arrangement. A water pot is attached to the column as a fixture, for the ready convenience of cooling the work when desired. This is an invention of ours which will be found of practical service. When water pot is not in use it can be swung under the table.

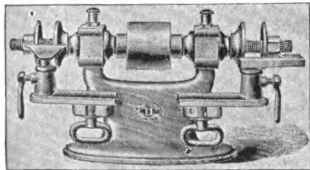
Size of Iron Table.....	16 x 10 inches
Size of Base of Column.....	16 x 13 "
Height from Floor.....	30 "
Weight of Column.....	100 pounds

Price on Column with Water Pot.....\$10.00

D 2650. GRINDING MACHINE No. 3.

This machine is designed to run two wheels up to 9 inches in diameter. It has a steel spindle; engine lathe boxes; two rests, with wrench permanently attached to each rest; the bearings so inclosed as to prevent the admission of emery dust. Nickel plated oil cups with patent oil feeders are used. This machine is thoroughly made throughout, and is well adapted for tool grinding, saw gumming and other light work. The countershaft and column used are shown and described below. Countershaft should run 525 revolutions, giving spindle 2100 revolutions per minute.

DIMENSIONS OF GRINDING MACHINE No. 3.



Size of Base.....	11 x 6 1/2 ins.
Height, Base to cen. Spindle....	7 "
Entire Length of Spindle.....	18 "
Length of Bearings, each.....	3 1/2 "
Diam. of Spindle in Bearings...	7/8 "
Diam. of Spindle bet. Flanges...	8 1/4 "
Size of Pulley on Spindle.....	3 x 2 1/4 "
Distance between Wheels.....	12 "
Wt. of No. 3 Machine, as shown,	36 lbs.

Price of No. 3 Grinding Machine (head).....\$16.00

D 2651. HELMET BRONZE LETTER OPENER.

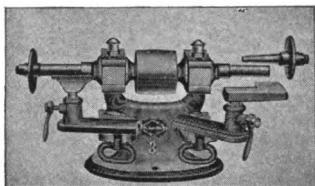


Actual length of opener, eight inches. This Letter Opener shows the elasticity of Helmet Spring Bronze. Letter Opener mailed on receipt of 16 cts. in stamps.

D 2656.

GRINDING MACHINE, No. 3.

Shown with Taper Arbor Fitted to Each End of Spindle.



This machine is our regular No. 3 machine with taper arbor fitted to each end of spindle, Morse, Pratt & Whitney or any other standard taper being used. The advantage of using taper arbors is that the wheels may be fitted perfectly true on to the arbors and left there permanently, so that they will always run true when placed on the machine, and will not need adjustment.

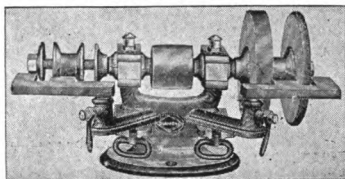
This is a convenience which all users of machines, where it is necessary to change the wheels often, will appreciate. The diameter of spindle between flanges of taper arbor is $\frac{1}{2}$ inch or $\frac{3}{4}$ inch, as ordered. A key is furnished to drive out arbor.

Price of Machine No. 3, with $\frac{3}{4}$ inch Spindle (outside of boxes), and two Taper Arbors shown, with two Emery Wheels $6 \times \frac{1}{2}$ in. each, $\frac{1}{2}$ in. hole.	\$25.00
Price of Machine No. 4, with 1 in. Spindle (outside of boxes) with two Taper Arbors shown, and two Emery Wheels $9 \times \frac{1}{2}$ in. each, $\frac{1}{2}$ in. hole.	35.00
Price of Extra Taper Arbors, each, without wheels, No. 3	3.00
Price of Extra Taper Arbors, each, without wheels, No. 4	5.00

D 2657.

FOUR WHEEL GRINDER (SHOP MARK A.)

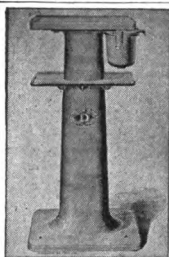
For Grinding and Sharpening Saws, Cutters, Chisels, Etc.



having 1 inch mandrel, when ordered. The Iron Column and Countershaft, shown below, is used for the machine having $\frac{3}{4}$ inch mandrel, and furnished when ordered. The Iron Stand, with Driving or Countershaft, as shown and described on page 241, or Column with Countershaft, described and shown on page 245, is used, and furnished with the machine. The machine with $\frac{3}{4}$ inch mandrel (between flanges) is designed to take wheels 10 inches in diameter; the machine with 1 inch mandrel (between flanges) wheels of 12 inches in diameter. The iron spool on the mandrel, having flanges of same diameter as those on the spindle, is loose, allowing the use of different thicknesses of emery wheels. A rest is provided for each wheel.

The machine is especially designed for shaping moulding bits, cutters and wood working tools, as Emery Wheels of different shaped face can be used. Also for sharpening and grinding saws.

Price of Four Wheel Grinder (with $\frac{3}{4}$ in. Mandrel between flanges)	\$20.00
“ Countershaft (No. 1 Patent, shown on page 239)	12.00
“ Iron Column for Four Wheel Grinder, shown below	12.00
“ Four Wheel Grinder (with 1 inch Mandrel between flanges)	32.00
“ Countershaft (No. 2 Patent, shown on page 241)	15.00
“ Iron Column, shown below	15.00
“ Iron Stand, shown on page 245	17.00

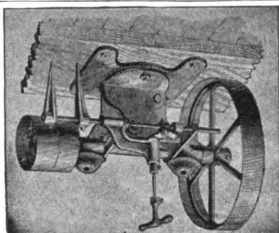


D 2658.

IRON COLUMN WITH WATER POT— FOR No. 3 MACHINES.

Size of Iron Table	16 x 10 inches
Size of Base of Column	16 x 13 “
Height from Floor	30 “
Weight of Column	125 lbs.

Price, with Water Pot.....\$12.00



D 2659.

HADLEY'S PATENT COUNTERSHAFT No. 1 AND BELT SHIFTER.

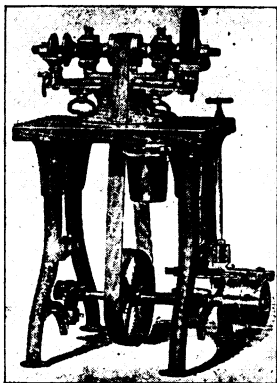
Used for No. 3 Grinding Machines. For dimensions and full description, see page 242.

Price.....\$12.00

For Useful
Tables, see
Back of
Book.

GRINDING MACHINE, No. 4. New Pattern, Improved and Enlarged.

Special
Drills.
Made to
Order.



tool grinding and light work. The countershaft should run 533 revolutions, giving spindle 1,600 revolutions per minute.

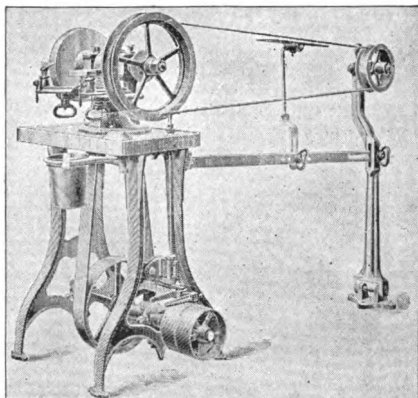
Price of Machine, Stand and Driving Shaft, as shown.....	\$60.00
“ Grinding Machine, (head).....	28.00
“ Frame, with Water Pot attached.....	17.00
“ Driving Shaft and Patent Belt Shifter attached, as shown.....	15.00
Hadley's Patent Countershaft, for overhead use, shown below.....	15.00

DIMENSIONS IN INCHES OF GRINDING MACHINE, No. 4.

Size of Base.....	12x8½	Size of Pulley on Spindle.....	4x3½
Height from Bench to center to Spindle.....	9	Height of Stand from floor to top of Iron Table.....	28
Distance between Wheels.....	15	Size of Iron Table.....	25x14
Length of Bearings.....	4	Weight of Stand.....	175 lbs.
Diameter of Spindle in Bearings.....	1 1-16	Weight (with Frame and Countershaft).....	300 lbs.
Diameter Spindle betw'n Flanges.....	1		

D 2666. No. 4 MACHINE MOUNTED ON FRAME.

Driving Shaft Under, with Belt Strapping Attachment. A.

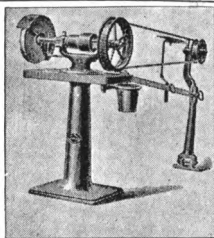


This cut shows an attachment applied to our regular No. 4 Machine, whereby polishing may be done by means of an endless belt. It is practically adapted to all kinds and shapes of articles in metals where an ordinary polishing wheel cannot be used. The flanged pulley can be readily removed from the machine, and an ordinary polishing or solid wheel used in its place. The belt strapping attachment can be supplied to use upon any machine that will run wheels 12 inches in diameter. We make eight widths of flange pulleys to run belts from 1¼ inch up to 6 inches. The one to use 2

inch belt will be sent unless otherwise ordered. The countershaft used with this machine, where the driving shaft shown is not required is our No. 2 Patent, shown on page 245; has tight and loose pulley, 6 inches in diameter, 2¾ inch face; driving pulley, 12 inches in diameter, 3 inch face. For the machine shown, countershaft should run 533 revolutions per minute; this will give to the spindle about 1600 revolutions per minute and to the belt 5000 feet per minute.

Price as shown, with 2 inch flange Pulleys, 12 inch and 6 inch.....	\$85.00
Price of No. 4 Grinding Machine, (head).....	28.00
“ Iron Frame, with Water Pot.....	17.00
“ Driving Shaft, or Hadley's Patent Countershaft.....	15.00
“ Belt Strapping Attachment.....	25.00

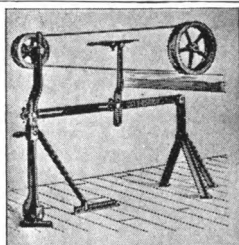
For prices on Endless Emery Belts see page 245.



D 2672. BELT STRAPPING ATTACHMENT A.

Arranged to be attached to frame of grinder or polishing machine. Uses belt 10 ft. long. Quickly adjusted. Flange pulleys 12 and 6 inches diameter, $2\frac{1}{2}$ inch face, 1 inch hole, carefully balanced; wider ones if desired.

Price, as shown, without Belt or Buff.....\$65.00
 " of Attachment..... 25.00
 " " Head, Single Pulley..... 17.50

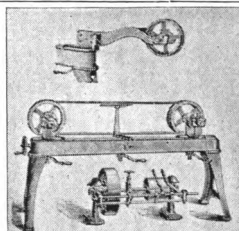


D 2673. BELT STRAPPING ATTACHMENT C.

Can be fastened to any part of floor. Long or short belt used. Thoroughly braced. Quickly adjusted. Flange pulleys 12 and 6 inches in diameter, $2\frac{1}{2}$ inches wide, 1 inch hole, carefully balanced; wider ones if desired.

Price, without Belt.....\$25.00
 " of Head for Bench..... 15.00

We make a heavier machine using pulleys 14 and 8 inches diameter, $3\frac{1}{2}$ to 6 inches wide.
 Price.....\$50.00



D 2674. BELT STRAPPING MACHINE D.

Heavy, rigid, durable. Bed 6 feet. Wheels 14 x $2\frac{1}{2}$ inches. Babbitt bearings. Easily and quickly adjustable. Will run at high speed. Overhanging head is a good feature for bicycle work.

Price, complete as shown.....\$150.00
 " without Overhanging Arm..... 125.00

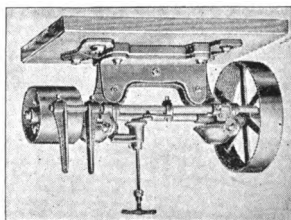
D 2675. ENDLESS EMERY POLISHING BELTS.

These belts are 12 feet long and endless, of any width up to 12 inches; they are made of two thicknesses of duck, with a layer of vulcanized rubber between, and are generally considered the best polishing belt.

$\frac{3}{8}$ inch in width, per foot.....	5c.	3 inches in width, per foot....	27c.
$\frac{1}{2}$ " " " ".....	6c.	4 " " " ".....	36c.
$\frac{3}{4}$ " " " ".....	8c.	6 " " " ".....	54c.
1 " " " ".....	10c.	8 " " " ".....	72c.
$1\frac{1}{2}$ " " " ".....	15c.	10 " " " ".....	90c.
2 " " " ".....	19c.	12 " " " ".....	108c.
$2\frac{1}{2}$ " " " ".....	23c.		

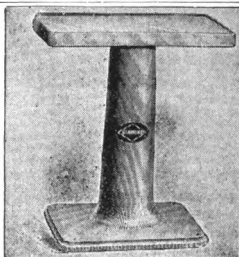
D 2676. COUNTERSHAFT AND BELT SHIFTER, No. 2,

Hadley's Patent.



This is used with No. 4 Machine where driving shaft attached to frame is not required. Both counter and driving shaft have tight and loose pulleys, 6 inches in diameter, $2\frac{3}{4}$ inch face. Driving pulley, 12 inches in diameter, 3 inch face. The drop of countershaft is $7\frac{1}{2}$ inches. Counter or driving shaft should run 533 revolutions per minute for emery wheels of 12 inch diameter on No. 4 Machine.
 Price as shown.....\$15.00

Special
Taps
Made to
Order.



D 2677. IRON COLUMN, WITH IRON TABLE.

Used for Mounting Grinding Machines,
 Nos. 4 and 5.

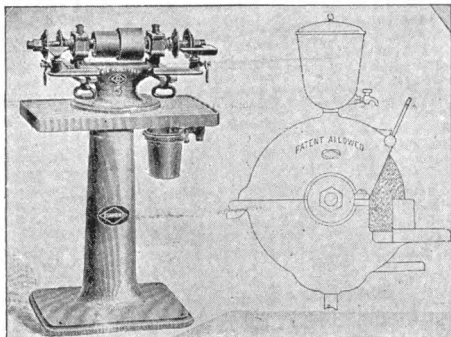
The column stands 34 inches from base to top; size of iron table is 25x14; weight of column, 130 pounds. Our machines are fitted to this column, when ordered.

Price.....\$15.00

D 2683.

GRINDING MACHINE No. 5.**New Pattern, on Iron Column and Table.**

The illustration to the right shows in outline an attachment which can be applied to any of the machines described on pages 242, 243, 244 and 246 when it is desired to use water. Price of Attachment: No. 2 Machine, \$10.00; No. 3 Machine, \$12.00; Nos. 4 and 5 Machines, \$15.00.



This machine will run two wheels 14 inches in diameter. It has steel spindles, arms for rests, both front and back, each rest is provided with patent iron wrench, attached to its place. The bearings are so inclosed as to prevent the admission of emery dust (patented Aug. 1, 1882). Nickel plated oil cups with patent oil feeders are used. Cast iron boxes are used and fitted as to an engine lathe. No. 5 Machine can be used upon stand with driving shaft under, as

shown on page 247. It is arranged to belt from below when desired.

Our No. 5 Grinding Machine has New Surface Attachment, made to use over the wheel, as on our No. 6, shown on page 247, and operated in the same manner as for that machine. | Price of Attachment.....\$25.00

DIMENSIONS OF GRINDING MACHINE.—Size of base, 13x10 in.; height from bench to center of spindle, 9 in.; distance between wheels, 16 in.; length of bearings, 4½ in.; diameter of spindles in bearings, 1 1-16 in.; diameter of spindle between flanges, 1 in.; size of cone pulley on spindle, 4½ and 3½x3¼ in.; weight of machine with iron column, 275 lbs. Countershaft used has tight and loose pulleys 6 in. in diameter, 2¾ in. face. Cone pulley, 11 and 12 in. diameter, 3¼ in. face. For our No. 5 Machine the countershaft should run about 550 revolutions per minute. This will give to the spindle, on the slowest speed, about 1,340 revolutions, on the quickest speed, about 1,880 revolutions per minute. The height of iron column from floor to top of stand is 30 inches. Size of iron table, 25x14 in. Weight of column, 175 lbs.

Price on column with countershaft as shown.....\$65.00

Price of machine (head).....33.00

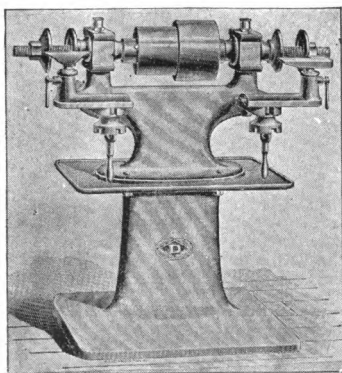
Price of iron column and table, with water pot.....15.00

Price of countershaft, with cone pulley and patent belt shifter.....17.00

D 2684.

GRINDING MACHINE No. 6.**New Pattern, Improved and Enlarged.**

Helmet Oil
Lubricates
Anything.



This machine is shown mounted on column with iron table, and will run two wheels up to 16 inches in diameter. It has a steel spindle, arms for rests, both front and back, each rest being provided with malleable iron wrench permanently attached to its proper place, and levers for securing rests firmly to frame. These latter attachments are secured to us by patents dated Aug. 1st, 1892. The bearings have our patent emery dust protectors and are supplied with nickel plated oil cups with patent feeders. The construction of this machine throughout is equal to the best make of engine lathes, and it will bear comparison with any machine of its class, as it has our latest improvements.

DIMENSIONS OF GRINDING MACHINE No. 6.—Size of base, 16½x10 in.; height from table to center of spindle, 12 in.; height from floor to top of iron table, 23 in.; height from floor to center of spindle, 35 in.; distance between wheels, 23 in.; dimensions of iron table, 26x20 in.; dimensions of base of column, 24x20 in.; length of bearings, 5½ in.; diameter of spindle in bearings, 1½ in.; diameter of spindle between flanges, 1¼ in.; size of cone pulley on spindle, 5 and 6x4½ in.; weight on column as shown, 500 lbs.; weight of column, 225 lbs.

The countershaft is similar to the one shown on page 241. It has tight and

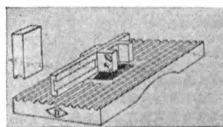
loose pulleys 8x4 $\frac{1}{2}$ in. and cone pulley 12 and 13x4 $\frac{1}{2}$ inches. Drop of hangers is 10 in. and shaft is 32 in. long. For our No. 6 Machine it should run 600 revolutions per minute. This will give the spindle, on the slowest speed, 1,200 revolutions; on the quickest speed, 1,560 revolutions per minute.

Price of No. 6 Grinding Machine, column and countershaft.....\$80.00
 " No. 6 Grinding Machine, head..... 46.00
 " Countershaft for No. 6 Machine..... 17.50
 " Iron Pedestal with table for No. 6 Machine..... 16.50
 " Adjustable Table Attachment, No. 6 Grinding Machine..... 30.00

D 2690.

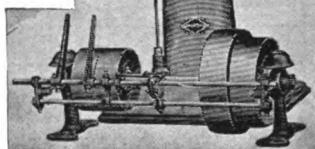
GRINDING MACHINE No. 6.

With Surface Table Attachment Over the Wheel.



DIE HOLDER

For surface table attachment. For holding dies to be ground any irregular shape, or flat. This holder can be furnished with our surface table on Grinding Machines Nos. 5, 6 or 7 at a special price.



The machine shown here is our regular pattern of No. 6 Grinder. It has fastened to the arms projecting from the back of the machine, a new design (patented June 26, 1883) of table attachment for doing surface work with facility. It is adapted to grinding dies and any work required to be ground straight. A certain class of work done upon the planer, milling machine or with files, can be placed upon this tool, where it can be done more quickly and at much less expense than by any other method.

The attachment will admit of using any thickness of emery wheel, from $\frac{1}{2}$ inch to 3 inches, by a patent arrangement of ours, leaving no open space either side of the wheel. It does not interfere with the operator's use of the rest on the front of the machine. The iron table has corrugated surface, into which the emery dust falls and is lead from the machine. This device gives a clear surface, free from dust. The screw and nut by which the table is raised from, or brought to, the emery wheel, is entirely inclosed in the hollow spindle of the casting, entirely away from the emery dust. The hollow cast iron spindle to which the surface table is fastened is neatly fitted to the stand that receives it, enabling it to revolve and turn away from the emery wheel when not in use. To turn it away from the wheel, the table must be raised by the screw on top of the sleeve, so that the table will clear the wheel. Loosen the set screw by means of the attached wrench, pull back the latch which is held in place by a spring, and the table can be swung to one side.

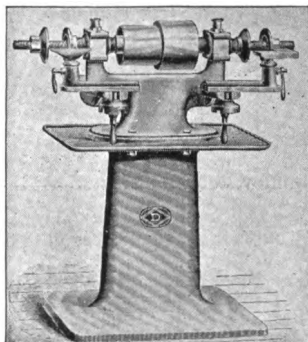
Price with column, countershaft and surface table attachment.....\$110.00

D 2691.

GRINDING MACHINE No. 7.

New Pattern, Improved and Enlarged.

This machine is designed to run two wheels up to 20 inches in diameter. In other respects description for this machine is same as shown above.



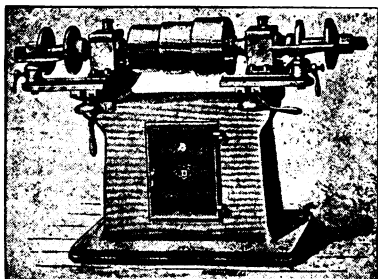
Size of Base on Head.....18 x 12 in.
 Height from Table to cen. Spindle.15 "
 Height, Floor to top of Iron Table.19 "
 Height, Floor to cen. of Spindle..34 "
 Distance between Wheels.....26 "
 Dimensions of Iron Table.....26 x 20 "
 Dimensions of Base of Column.26 x 24 "
 Length of Bearings.....6 "
 Diam. of Spindle in Bearings...1 9-16 "
 Diam. of Spindle bet. Flanges...1 $\frac{1}{2}$ "
 Size Cone Pul. on Spindle..6 & 7 x 4 $\frac{1}{2}$ "
 Length of Spindle.....39 $\frac{1}{4}$ "
 Weight of No. 7 Machine, with Countershaft.....750 lbs.
 Weight of Column on which No. 7 Machine is placed.....275 "
 Price on Col. with Countershaft..\$108.00
 Price of Grinding Machine Head.. 70.00
 C'ntersh'ft similar to D2638, p. 241. 20.00
 Price of Iron Column with Table. 18.00

An adjustable table attachment for surface grinding is furnished for our No. 7 Machine, as described for our No. 6 machine, shown above.
 Price of Surface Table Attachment for our No. 7 Grinding Machine\$35.00

D 2696.

GRINDING MACHINE No. 8.

This machine is of heavy construction, very strong and durable, yet of neat design, and will run two wheels up to 34 inches in diameter. It has a steel spindle, engine lathe boxes, arms for rests, both front and back, each rest being provided with our patent wrench and patent levers for securing them firmly to the frame. The bearings have our patent dust excluding attachment and nickel-plated oil cups with patent oil feeders are used.



The construction of the machine throughout is equal to the best work done on an engine lathe. It has all our latest im-

provements and is a valuable tool for use in any foundry or machine shop.

A surface attachment is provided when desired. Dimensions:

Distance between Wheels.....40 inches

Length of Bearings.....8½ "

Diameter of Spindle in Bearings.....2½ "

Diameter of Spindle between Flanges, as ordered.....1¾ or 2 "

Height from Floor to center of Spindle.....32 "

Diameter of Flanges.....8 "

Size of Cone on Spindles.....8, 10 and 12 x 5¼ "

Size of Base.....26 x 38 "

Size of Tight and Loose Pulleys on Countershaft.....10 x 5¼ "

Size of Cone Pulley on Countershaft.....14, 16 and 18 x 5¼ "

Speed of Countershaft.....350 revolutions per minute

Weight of Machine with Countershaft.....1200 pounds

Price, including Countershaft, 1¾ in Spindle between Flanges.....\$175.00

Price, including Countershaft, 2 in. Spindle between Flanges.....187.50

Price of Surface Attachment for No. 8 Machine.....75.00

For prices on Endless Emery Polishing Belts, see page 245.

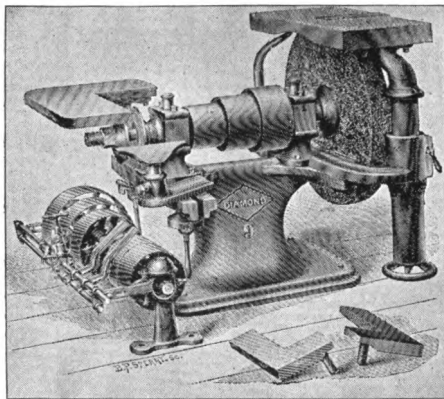
**Milling
Cutters
Made for
Bicycle
Work.**

D 2697.

GRINDING MACHINE No. 9.

With Countershaft and Surface Grinding Attachment.

This machine is designed to run two wheels up to 42 inches in diameter. It is a very heavy machine for large work, and has engine lathe boxes, patent



emery dust excluding device, brass oil cups, patent oil feeders, and all our patent improvements. It is shown with surface grinding attachment, designed to fasten to the arms at the back of machine. It can be raised and lowered at the will of the operator, and when not in use turned away from the wheel. It has right and left hand rest, also an extra large elbow table rest, extending past the center, thus enabling the operator to use the side of the wheel as well as the face. The countershaft has Hadley's Patent Belt Shifter.

Countershaft has cone pulley 12, 14 and 16 inches

in diameter, 6¼ inch face. Tight and loose pulley, 10 inch diameter, 6¼ inch face. Drop of hangers, 12 inches. Length of shaft, 50 inches; diameter, 1¾ inch. Boxes 1¾ x 5 inches. For our No. 9 Machine, countershaft should run 400 revolutions per minute. This gives to the slowest speed, 400 revolutions; to the quickest speed, 800 revolutions per minute.

Distance between Wheels.....39 ins.

Length of Bearings.....10 "

Diam. of Spindle in Bearings.....2½ "

Diam. of Spindle bet. Flanges.....2½ "

Height, Floor to cen. Spindle.....30 ins.

Size of Cone Pulley on Spin.

de.....8, 10 and 12 x 6¼ "

Weight of No. 9 Machine.....2400 lbs.

Price, including Countershaft.....\$267.50

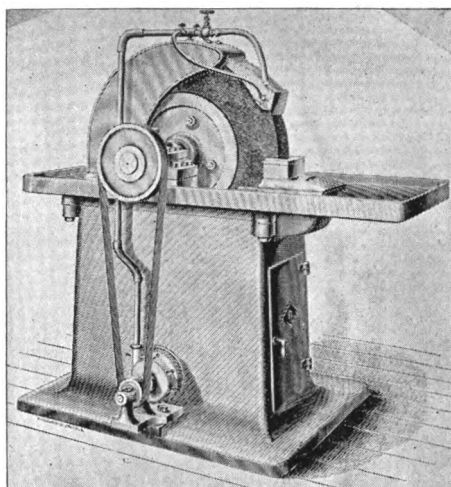
Price of Surface Attachment for No. 9 Grinding Machine.....100.00

Price of Special Elbow Table Rest.....25.00

D 2704.

SINGLE WHEEL TOOL GRINDERS.

Using Wheels:	No. 2. 18 x 2 1-2	No. 3. 24 x 3 1-2	No. 4. 30 x 4	No. 5. 36 x 4
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The machine has tanks located inside of column, easily accessible. An arrangement patented (May 7, 1889,) draws the water by siphon from the upper to the lower tank. Engine lathe boxes are used protected at each end by patented dust excluding device.

The water is distributed on the wheel directly in front of the tool being ground. On the inside of the hood a raised surface is cast, which is the outside diameter of the flanges used, and which leads all spray or water from the inside of the hood to the column, keeping it entirely from the spindle and boxes; for this device and others we have applied for patents.

The rests are movable to and from the wheel, without the use of wrench. The collars, steel spindles, pulleys and all running parts are turned accurately to obtain a well balanced, smooth-running machine.

The Tool Grinder with an Automatic Pump and separate water tanks, with our patented siphon arrangement for separating the clean water from the dirt and sediment, with the power to control or regulate the flow of water over the wheel and tool, when being ground by the operator, will always have an advantage over any machine of this class that uses the same water over and over, mixed with the sediment from the wheel, from which no provision has been made to separate the same, or to regulate the flow of it upon the wheel.

Prices and dimensions on pages 249 and 250.

D 2705.

TOOL GRINDER, No. 2.

Emery Wheel 18 x 2 1-2 x 1 3-4 Inches.

Size of Base	24 x 27	inches.
Height from floor to center of Spindle	38	"
Engine Lathe Boxes for Bearings, each	7	"
Diameter of Spindle in Bearings	1 1/2	"
Diameter of Spindle between Flanges	1 3/4	"
Diameter of Cone Pulley on Spindle	5 and 6 x 3 1/2	"
Weight	800	pounds.

Badger
Die
Stock
Always
Cuts
Same
Size.

Price, complete with Countershaft and Truing Device.....\$150.00
Countershaft has tight and loose pulleys, 8 inches in diameter, 3 1/2 inch face. Cone pulley, 12 and 13 inches diameter, 3 1/2 inch face. The drop of hangers is 10 inches. Entire length of shaft, 34 inches. It should run 250 revolutions per minute. This will give the spindle, on the slowest speed, 500 revolutions, on the quickest speed 650 revolutions per minute.

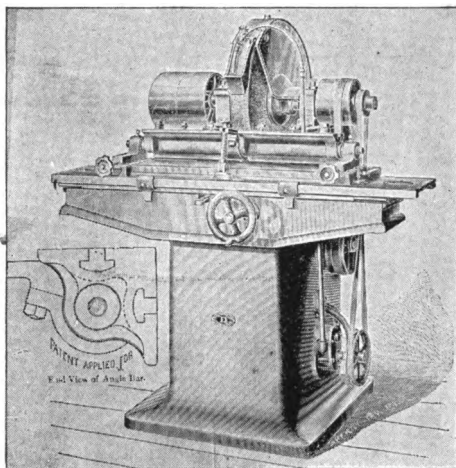
D 2706.

TOOL GRINDER, No. 3.

Emery Wheel 24 x 3 1-2 x 10 Inches.

Size of Base	26 x 40	inches.
Height from floor to center of Spindle	36	"
Engine Lathe Boxes for Bearings, each	8	"
Diameter of Spindle in Bearings	1 1/2	"
Diameter of Spindle between Flanges	2	"
Diameter of Pulley on Spindle	10 inches, 5 inch face.	
Weight	1,500	pounds.

Price, complete with Countershaft and Truing Device.....\$250.00
Countershaft has tight and loose pulley, 10 inches in diameter, 5 1/4 inch face. Driving pulley, 17 inches diameter, 6 inch face.
Entire length of shaft, 40 inches; drop of hangers, 12 inches.
Countershaft should run 260 to 280 revolutions per minute; this will give to the spindle a speed of from 442 to 476 revolutions per minute.

D 2712. IMPROVED DIAMOND AUTOMATIC KNIFE GRINDER.

This machine is designed to grind knives for planers, paper cutters, tobacco cutters, rag cutters, iron shears, and, in fact, knives of any sort. The column is large and very stiff, the bed does not spring when the machine is bolted to the floor as it would be liable to do if it were supported by legs. The wheel is carried on a steel spindle running in extra long bearings fully protected from dust. It is mounted on a carriage which is fed to the work either by hand or automatically. The water hood is so arranged that all water is distributed directly on the wheel in front of the knife. A raised surface inside the hood

leads all waste water and spray directly back to the patented siphon tank. No water will pass outside the hood, and the table is so arranged that no water will remain upon it. The table has automatic power feed in both directions. The angle iron on which the knife is clamped is very strong and is arranged so that the wheel will grind toward the edge or the angle iron may be reversed and the knife be ground toward the butt. The angle iron holding the knife is moved to the wheel by small hand screws at each end. By this device the edge of the knife may be brought perfectly parallel to the guides on which the platen travels, after which the emery wheel is brought to the knife by the hand wheel. The center of the angle bar is encircled by a split yoke, and by loosening a screw in the yoke the knife may be swung into any desired pitch to the wheel. The platen is very wide and travels on wide ways. The machine has single pulley or tight and loose pulleys. We furnish overhead water pot and drip for price named. Size of base on floor, 26x32 in. Height from floor to center spindle, 38 in. Countershaft has tight and loose pulley 10x4½ in. Driving pulley 14x4½ in., and should run about 200 revolutions per minute, giving the emery wheel a speed of 350 revolutions per minute.

26 in. Knife Grinder, with 24 in. wheel, T. & L. Pulley, weight, 1,200 lbs., \$187.50
 40 " " " " 24 " " " " 1,400 " 200.00
 36 " " " " 26 " " " " 1,600 " 250.00

Add \$25.00 to list price for Automatic Cross Feed of the wheel to the work.
 Add \$25.00 to list price for Automatic Pump and Connections. Price of Countershaft for this machine, \$18.00.

D 2713.**TOOL GRINDER, No. 4.**

Emery Wheel 30 x 4 x 16 Inches. (See p. 249.)

Size of Base.....	28 x 45 inches.	Special
Height from floor to center of Spindle.....	37 "	Taps,
Engine Lathe Boxes for Bearings, each.....	9 "	Reamers,
Diameter of Spindle between Flanges.....	3 "	Milling
Diameter of Pulley on Spindle.....	14 inches, 6 inch face.	Cutters,
Weight.....	2,000 pounds.	Made to
		Order.

Price, complete with Countershaft and Truing Device.....\$300.00

Countershaft has tight and loose pulleys, 10 inches diameter, 6 inch face.
 Driving pulley, 18 inches diameter, 6 inch face.

Entire length of shaft, 40 inches; drop of hangers, 12 inches.

Countershaft should run 260 to 280 revolutions per minute; this will give to the spindle a speed of 334 to 360 revolutions per minute.

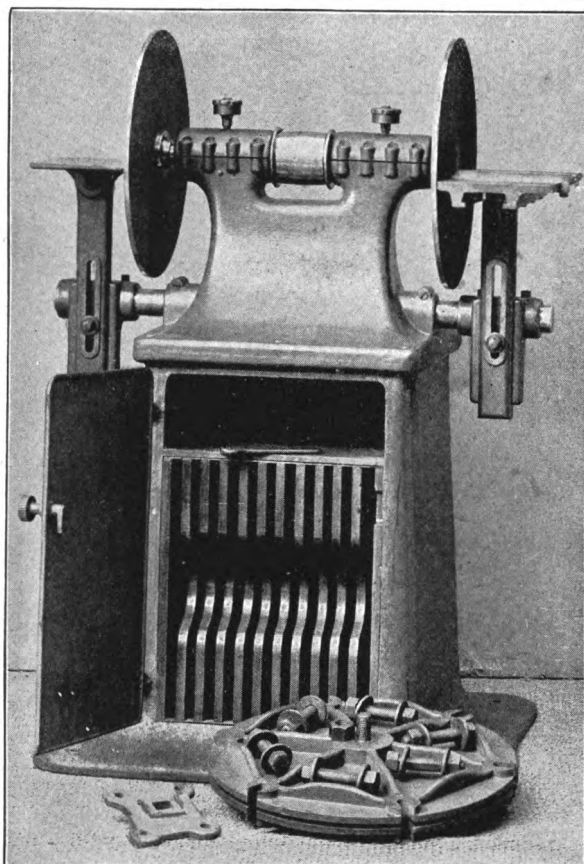
D 2714.**TOOL GRINDER, No. 5.**

Emery Wheel 36 x 4 x 3 Inches. (See p. 249.)

Size of Base.....	28 x 51 inches.
Height from floor to center of Spindle.....	37 "
Engine Lathe Boxes for Bearings, each.....	10 "
Diameter of Spindle between Flanges.....	3 "
Diameter of Pulley on Spindle.....	16 inches, 6 inch face.
Weight.....	2,500 pounds.

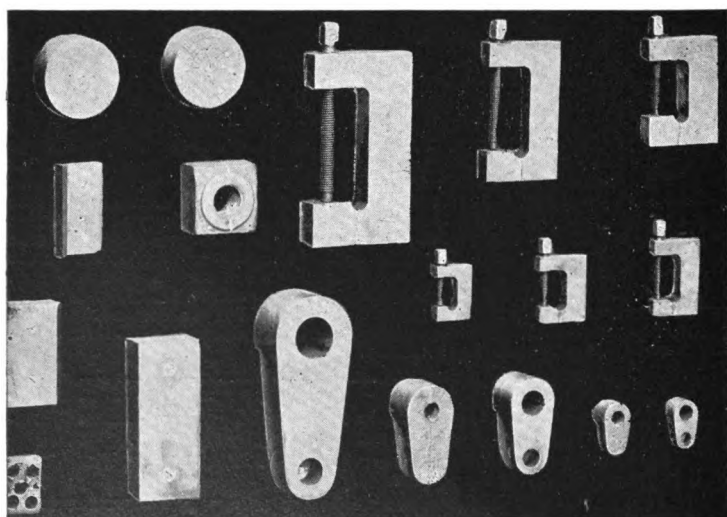
Price, complete with Countershaft and Truing Device.....\$350.00

The Countershaft has the same dimensions as for No. 4 machine, and should run 260 revolutions per minute, giving to the machine a speed of 292 revolutions per minute.



Gardner
Die Stock is
Adjustable.

D 2726. No. 4 Gardner Grinder. List and description on preceding page.



Sample Work Done on the Gardner Grinder.

D 2732. EMERY CLOTH AND EMERY PAPER CIRCLES.

For Use on Gardner Grinder.

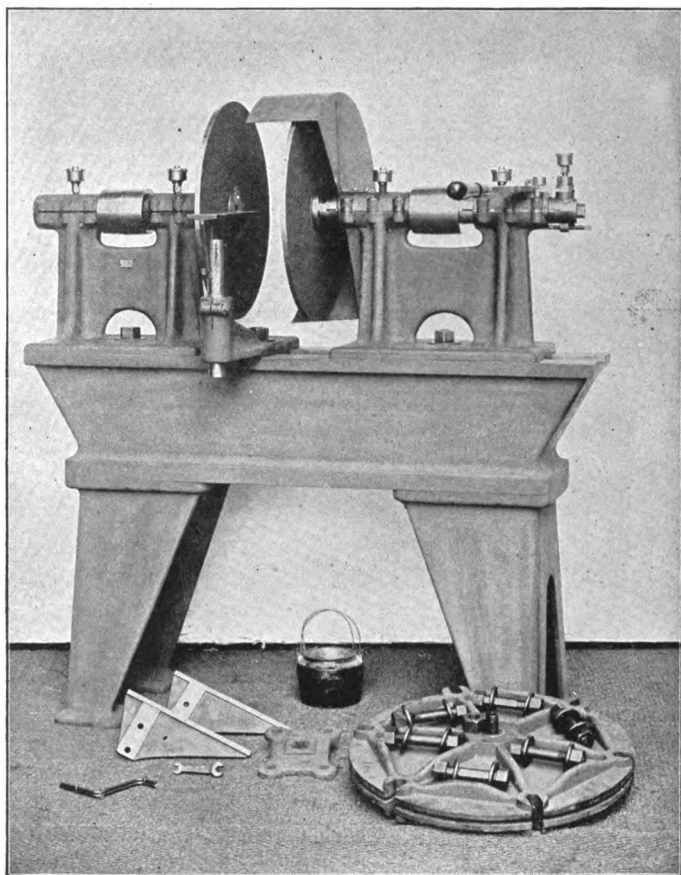


PAPER.						CLOTH.					
Nos.	.....	00-1½	2	2½	3	00-1½	2	2½	3		
10 in. dia.		\$0.03	.04	.04½	.05½	\$0.10	.11	.14	.16		
12 "		.04	.05	.06	.07	.11	.14	.16	.18		
18 "		.08	.11	.13	.15	.20	.24	.28	.32		

We also make Spiral Emery Paper Circles, which take same list as above. We are making 18-inch circles in both paper and cloth with 10-inch hole in center, same list as above.

D 2733. DOUBLE DISC GARDNER GRINDER No. 6.

The newly designed Gardner Grinder, illustrated herewith, is now being made with the two discs close together and parallel with each other. This new form of the Gardner Grinder is adapted to grinding two faces which are opposite and parallel to each other, such as square and hex headed screws and nuts, washers, spanner wrenches, machine keys, also milled nuts ready for case hardening, etc. The left-hand head is fixed to the bed; the right-hand head can be moved and set at any desired point. Its spindle has about 1-inch movement endwise, this movement being effected by means of a lever which is attached to a sliding sleeve. This sleeve carries a stop screw for adjusting the space between the two wheels. By means of the adjustable stop, many pieces may be ground accurately to size without trying each piece with caliper or gauge. The disc wheels are made from steel and are ground flat. Work can be ground true on the Gardner Grinder to the ten thousandth part of an inch.



Special
Taps,
Any Size,
Made to
Order.

D 2733. Double Disc Gardner Grinder No. 6.

The cutting faces of the wheels are emery paper or cloth, which are glued on the steel discs, and securely held in place by the spiral grooves on each face of the disc. The cutting surface of the emery cloth sinks into the spiral groove, thus forming a clearance for the particles of emery and iron to fall in so that these particles do not roll between the

cutting face and the work and prevent the wheel from cutting. This feature makes the Gardner Grinder a fast and perfectly smooth cutter, and it will do from two to ten times the work of a solid wheel in the same time.

If the work is large enough to allow free use of the hand between the wheels, nothing else is required to hold and move the work on the rest; but if the wheels must be run near together, a stick notched or recessed is used to hold and move the work on the rest between the wheels.

Square or hexagon-head set or cap screws can be simply burred or finished very rapidly.

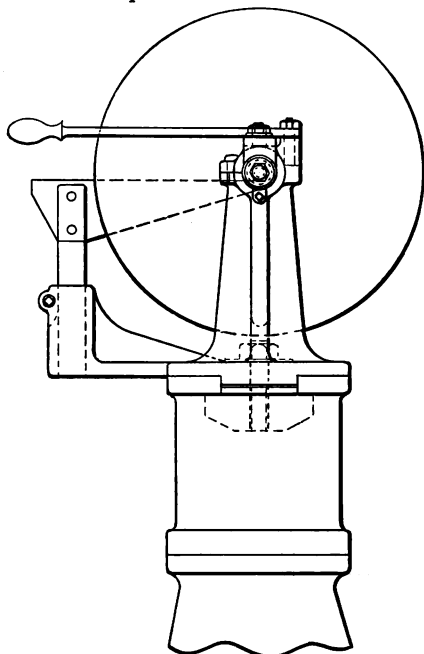
With the parallel discs as many as 800 square head set screws can be ground in an hour, grinding the four sides of each head and making the opposite sides parallel. Diameter of discs, 18 inches.

These machines are built to run at a high speed and maintain their accuracy.

Speed of countershaft No. 6 Grinder 450 rev. per minute.

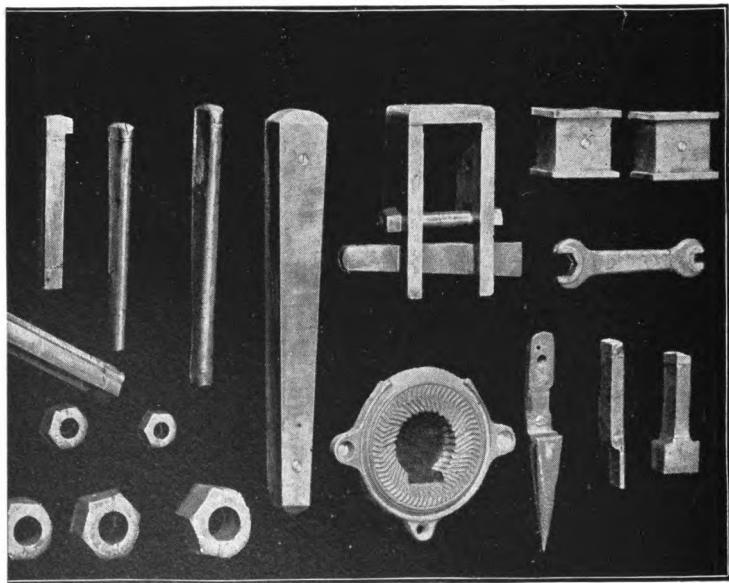
Driving machine about 1,800 rev. per minute.

Price No. 6 Grinder with press and countershaft, \$430.00.



D 2733. End View.

"Astonishing efficiency of these emery-paper-covered discs as grinding wheels."—American Machinist.



Sample Work Done on the Gardner Grinder.

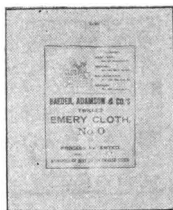
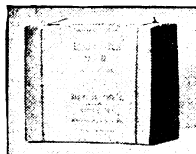
REAM PAPER.

D 2739.

GARNET PAPER.

Per ream

Assorted.....	\$5.50
Nos. 00 to 1½.....	5.50
No. 2.....	6.00
No. 2½.....	6.50
No. 3.....	7.00



D 2740.

FLINT PAPER—Our Best.

Assorted.....	Per ream.	\$4.50	Per quire.	\$0.25
Nos. 00 to 1½.....	" "	4.50	" "	.25
Nos. 2 to 3.....	" "	5.00	" "	.30

D 2741.

STAR FLINT PAPER.

All numbers	Per ream.	\$3.75
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D 2742.

EMERY PAPER.

Nos. 00 to 1½.....	Per ream.	\$6.50	Per quire.	\$0.40
No. 2.....	" "	7.50	" "	.50
No. 2½.....	" "	9.50	" "	.60
No. 3.....	" "	11.50	" "	.70

D 2743.

EMERY CLOTH.

FF and Crocus Cloth.....	Per ream.	\$18.00	Per quire.	\$1.00
Nos. 00 to 1½.....	" "	18.00	" "	1.00
No. 2.....	" "	20.00	" "	1.15
No. 2½.....	" "	24.00	" "	1.30
No. 3.....	" "	26.00	" "	1.50

ROLL PAPER, 50 YARDS LONG.

GARNET PAPER.

Width.....	24 in.	30 in.	36 in.	40 in.	42 in.	48 in.
Nos. 00 to 1½.....	\$6.00	\$ 9.00	\$11.00	\$13.00	\$15.00	\$18.00
No. 2.....	6.50	10.00	12.00	14.00	16.00	20.00
No. 2½.....	7.25	11.00	13.00	15.00	17.00	22.00
No. 3.....	8.25	12.00	14.00	16.00	18.00	25.00
No. 3½.....	9.50	14.00	16.00	18.00	20.00	29.00
No. 4.....	10.50	16.00	18.00	21.00	23.00	32.00

D 2745.

EXTRA FLINT PAPER.

Width.....	24 in.	30 in.	36 in.	40 in.	42 in.	48 in.
Nos. 00 to 1½.....	\$5.00	\$ 8.00	\$10.00	\$12.00	\$13.00	\$15.00
No. 2.....	5.50	9.00	11.00	13.00	14.00	17.00
No. 2½.....	6.00	10.00	12.00	14.00	15.00	18.00
No. 3.....	6.50	11.00	13.00	15.00	16.00	20.00
No. 3½.....	7.50	13.00	15.00	17.00	18.00	23.00
No. 4.....	8.50	15.00	17.00	20.00	21.00	26.00

D 2746.

EMERY PAPER—Width 24 Inches.

Nos. 00 to 1½.....	\$6.50	No. 2½.....	\$ 9.00
No. 2.....	7.50	No. 3.....	11.00

D 2747.

EMERY CLOTH.

Width.....	9 in.	18 in.	Width.....	9 in.	18 in.
No. 00 to 1½.....	\$7.50	\$15.00	No. 2½.....	\$10.50	\$21.00
No. 2.....	9.00	18.00	No. 3.....	12.50	25.00

D 2748.

SAND CLOTH—Width 14 Inches.

Nos. 00 to 2.....	\$10.00	Nos. 2½ and 3.....	\$12.50
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Customers will find it to their advantage to order in original packages, thereby securing well pressed and tightly bound goods. For convenience in handling, we put the following

NUMBER OF REAMS IN EACH BUNDLE.

Number.....	00	0	½	1	1½	2	2½	3	As't'd
Flint Paper.....	5	5	4	3½	3	2½	2	1½	2½
Star Paper.....	5	5	4	3½	3	2½	2	1½	2½
Emery Paper.....	4½	4	3½	3	2½	2	1½	1½	2½
Garnet Paper.....	4½	4	3½	3	2½	2	1½	1½	2½
Emery Cloth.....	2½	2½	2	1¾	1½	1¼	1	¾	2

ROLL PAPER.

	Length.	Width, inches.					
Extra Flint Paper.....	50 yds.	24	30	36	40	42	48
Garnet Paper.....	50 yds.	24	30	36	40	42	48
Emery Paper.....	50 yds.	24	.....	.....	.....	.....	.....
Emery Cloth.....	50 yds.	9	18	.....	.....	.....	.....
Sand Cloth.....	50 yds.	14	.....	.....	.....	.....	.....

Parallel
Clamps
Hold
Work
True.

FRENCH EMERY PAPER.

	Per 100	Per Sheet
No. 0000, 000, 00, 0, 1, 2, 3, 4, 5.....	\$2.50	\$0.03
No. 6.....	3.00	.04

WALRUS LEATHER.

For Polishing all Kinds of Metal.

Walrus hide, when properly tanned, has a peculiar, tough grain, and is used largely by brass and silver finishers, cutlery, stove manufacturers and nickel platers. Manufacturers of hardware, edge tools, and agricultural implements who require a fine polish, will find this leather the best, as well as the most economical for solid wheels or for covering wood wheels. Hides from 50



to 150 pounds, and from $\frac{1}{2}$ to $1\frac{1}{4}$ inches thick.

					Per lb.					Per lb.
$\frac{1}{2}$	inch thick.	Price by the hide.....			\$1.20	Price cut in strips.....				\$2.00
$\frac{3}{8}$	" "	" " " "			1.40	" " " "				2.25
$\frac{3}{4}$	" " "	" " " "			2.00	" " " "				2.75
1	" " "	" " " "			2.50	" " " "				3.25
$1\frac{1}{4}$	" " "	" " " "			3.00	" " " "				4.00

WOOD POLISHING WHEELS.

Believing that a tool running at such a speed as these require should be made in the best possible manner, we make these wheels in the most careful and best manner which our long experience makes known to us. We use only the very best well dried, selected thin pine, planed, and when glued, each piece has its grain at right angles to those on each side. In gluing up, both wood and glue are made hot, and put into a heavy hydraulic press, and kept there until cold. The covering is a selected heavy



oak-tanned leather, unless some special covering is ordered.

Diam't'r	THICKNESS IN INCHES.								
	1	1½	2	2¼	2½	2¾	3	3½	4
8	\$2.25	\$2.50	\$2.80	.....	.....	.....	.....	.....	.....
9	2.50	2.80	3.10	\$3.25	\$3.50	.....	.....	.....	.....
10	2.80	3.10	3.25	3.50	3.75	\$4.00	\$4.25	\$4.50	\$4.90
12	3.00	3.25	3.50	3.75	4.00	4.25	4.50	5.00	5.50
14	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.50	6.00
16	4.00	4.25	4.50	4.75	5.00	5.25	5.50	6.00	6.50
18	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.50	7.00
20	5.00	5.25	5.50	5.75	6.25	6.50	6.75	7.10	7.50
22	5.50	5.75	6.00	6.25	7.00	7.25	7.50	8.00	8.50
24	6.00	6.25	6.50	6.75	8.00	8.40	8.75	9.25	10.00
26	6.50	6.75	7.00	7.25	8.50	8.75	9.00	9.50	10.50
28	7.00	7.25	7.50	7.75	9.00	9.25	9.50	9.75	11.00
30	7.50	7.75	8.00	8.25	9.50	9.75	10.00	10.25	11.50

Double flange, \$0.50 extra. Tapered Wheels, 10 per cent extra. Any size of wheel made to order at special price. Above prices for wheels with Bushings for $\frac{3}{4}$ or 1 inch spindle. Bushings for $1\frac{1}{4}$ inch spindle \$0.25 extra. Uncovered wheels $\frac{1}{4}$ less. Any size of Wheels up to 36 inches made to order. Special covering put on when ordered, price of which depends on material ordered.

SOLID LEATHER POLISHING WHEELS.

The Solid Leather Wheels are made in several grades—soft, medium, hard, and their different modifications, and are adapted to all kinds of polishing in a superior manner to that done with leather covered wheels, the fiber edge being much better than the grain surface of a strap or band.



These Wheels are made of disks of new oak tanned leather, put together with elastic waterproof cement, and under a heavy hydraulic pressure.

The material used in the manufacture of the wheel is prepared in such a manner as to closely resemble the finest walrus or sea-horse leather, over which it has many advantages—among others, an economy of 50 per cent. at the present time, and as walrus and sea-horse get scarcer every year, this percentage will be materially increased.

They have advantages over other wheels, being pliable and elastic, can be turned to any shaped face, saves the continuous expense of re-covering, as a coat of emery is all that is needed to make them ready for service.

They will wear for years, and while the first cost may be higher than many wheels, they are cheaper in the end, as an application of emery lasts longer, more work can be done in a given time and with less fatigue to the workman.

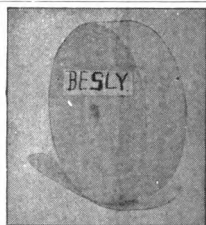
Being waterproof, they can be washed when new emery is needed, without injury to the wheel. A grinder can do more work without fatigue by reason of its elasticity and at the same time be perfectly insured against its bursting, as one glance at its plan of construction will testify.

They have given general satisfaction on stoves, cutlery, plows, edge tools, saddlery hardware, nickel goods, jewelry, pearl, etc.

DIRECTIONS FOR USE.—Screw on spindle only tight enough to hold in place. If any flutter or side motion, sometimes caused by careless handling or screwing too tight, it can be remedied by side pressure of the hand, or by loosening or tightening nut on spindle. Always remember to use care the first time in setting the wheel.

Run in direction indicated by arrow on face. **SOFT AND MEDIUM** for silver, nickel work, brass, etc. **MEDIUM** for stove, axe, plow work and saddlery hardware. **HARD** for gold, brass, emery hard grinding, and for grease or oil work.

Thick'n's	1/4	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4
Diam. 3	\$.35	\$.45	\$.70	\$.90	\$1.15	\$1.35	\$1.55	\$1.80	\$2.15	\$2.25	\$2.70	\$3.15	\$3.60
" 4	.45	.55	.75	1.10	1.40	1.65	1.95	2.20	2.50	2.75	3.30	3.85	4.40
" 5	.50	.65	1.00	1.30	1.65	1.95	2.30	2.60	2.95	3.25	3.90	4.55	5.20
" 6	.60	.75	1.10	1.50	1.90	2.25	2.65	3.00	3.40	3.75	4.50	5.25	6.00
" 7	.65	.90	1.30	1.75	2.20	2.65	3.10	3.50	3.95	4.40	5.25	6.15	7.00
" 8	.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	6.00	7.00	8.00
" 9	.90	1.20	1.75	2.35	2.95	3.50	4.10	4.70	5.30	5.90	7.05	8.25	9.40
" 10	1.05	1.40	2.05	2.75	3.45	4.15	4.80	5.50	6.20	6.40	8.25	9.65	11.00
" 12	1.45	1.90	2.80	3.75	4.70	5.65	6.55	7.50	7.95	8.90	10.25	12.15	15.00
" 14	1.85	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50	15.00	17.50	20.00
" 16	2.35	3.15	4.70	6.25	7.80	9.40	10.95	12.50	14.00	15.65	18.75	21.90	25.00
" 18	2.85	3.75	5.65	7.50	9.40	11.25	13.15	15.00	16.90	18.75	22.50	26.25	30.00
" 20	3.40	4.50	6.75	9.00	11.25	13.50	15.75	18.00	20.25	22.50	27.00	31.50	36.00



D 2765. SHEEP SKIN WHEELS.

Our loose edge Sheep Skin Wheels are made from skins of the best quality and of special tannage for this purpose; are of heavy weight, soft and pliable, and have decided advantages over felt, rag or other finishing wheels.

With emery or other polishing materials applied to face with glue or oil, they are very satisfactory for uneven surfaces.

They are made true, and manufacturers who have been in the habit of making their own wheels in an irregular manner, will find superior finish.

convenience and economy in using them. We have testimonials from many of the best firms in the country as to the merits of this wheel.

Thick-ness.	1	1 1/2	2	2 1/2	3	Thick-ness.	1	1 1/2	2	2 1/2	3
Diam. 4	\$1.10	\$1.65	\$2.20	\$2.75	\$3.25	Diam. 9	\$2.50	\$3.75	\$5.00	\$ 6.25	\$ 7.50
5	1.30	2.00	2.60	3.25	3.75	10	3.00	4.50	6.00	7.50	9.00
6	1.50	2.25	3.00	3.75	4.50	12	4.00	6.00	8.00	10.00	12.00
7	1.75	2.60	3.50	4.50	5.25	14	5.00	7.50	9.50	12.00	14.50
8	2.00	3.00	4.00	5.00	6.00	16	6.00	9.00	12.00	14.50	17.50

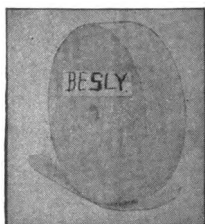
D 2766. THE EXCELSIOR STRAW PAPER WHEELS.

Our Straw Paper Wheel with Emery or Corundum applied to face, is highly recommended for roughing or hard cutting, with the advantage of cheapness, in comparison with Solid Emery Wheels.

Have given great satisfaction where a hard wheel is needed, with fine emery or other cutting materials.

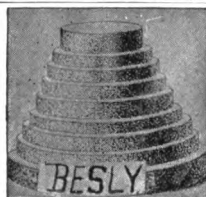
They can be used with Leather Band the same as Wood Wheels, with advantage of safety, true running, and with less noise and fatigue to the workman. They can be turned to any shaped face.

DIRECTIONS FOR USE.—Screw on spindle only tight enough to hold in place. If any flutter or side motion, sometimes caused by careless handling, or screwing too tight, it can be remedied by side pressure of the hand, or by loosening or tightening



nut on spindle. Always remember to use care the first time in setting up any wheel. Run in direction indicated by arrow on face. Old emery should be removed with some sharp-pointed tool. If water is used (which we do not recommend), they should be thoroughly dried before applying the glue.

Thickness.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Diam. 4 in.	\$0.25	\$0.35	\$0.45	\$0.55	\$0.65	\$0.75	\$0.85	\$0.90	\$1.00	\$1.15	\$1.35	\$1.65
" 5 "	.35	.45	.55	.65	.75	.85	.95	1.05	1.15	1.30	1.45	1.70
" 6 "	.45	.55	.65	.75	.85	.95	1.05	1.15	1.25	1.40	1.60	1.85
" 7 "	.50	.60	.75	.85	.95	1.15	1.25	1.50	1.70	1.85	2.00	2.25
" 8 "	.60	.75	.90	1.05	1.20	1.30	1.45	1.65	1.85	2.15	2.35	2.75
" 9 "	.75	.90	1.05	1.20	1.35	1.50	1.75	2.00	2.20	2.50	2.85	3.25
" 10 "	.85	1.00	1.15	1.35	1.65	1.85	2.00	2.35	2.50	3.00	3.25	3.75
" 12 "	.95	1.15	1.35	1.65	1.95	2.20	2.45	2.75	3.00	3.50	4.00	4.50
" 14 "	1.10	1.35	1.60	1.85	2.10	2.40	2.75	2.95	3.25	3.85	4.50	5.00
" 16 "	1.35	1.50	1.80	2.15	2.45	2.80	3.10	3.50	3.75	4.35	5.00	5.50
" 18 "	1.65	2.00	2.25	2.60	3.00	3.50	4.00	4.25	4.75	5.50	6.50	7.00
" 20 "	2.00	2.40	2.75	3.25	3.75	4.25	4.75	5.25	5.75	6.75	7.50	8.50



D 2772.

FELT POLISHING WHEELS.

Gardner
Grinder
for Flat
Grinding

We keep in stock the sizes shown below:

Extra Spanish. Per lb., \$2.50.	Extra Spanish. Per lb., \$2.50.	White America Per lb., \$2.00.	Gray French. Per lb., \$2.00.	Brown Mexic'n Per lb., \$1.75.
8 x $\frac{1}{2}$	12 x $\frac{1}{2}$	12 x 1	9 x $\frac{1}{2}$	9 x 1
8 x 1	12 x $\frac{3}{4}$	12 x $1\frac{1}{2}$	9 x $\frac{3}{4}$	9 x $1\frac{1}{2}$
8 x $1\frac{1}{2}$	12 x 1	12 x 2	9 x 1	9 x 2
8 x 2	12 x $1\frac{1}{4}$	14 x 1	9 x $1\frac{1}{4}$	10 x $1\frac{1}{2}$
9 x $\frac{1}{2}$	12 x $1\frac{1}{2}$	14 x $1\frac{1}{2}$	9 x $1\frac{1}{2}$	10 x 2
9 x $\frac{3}{4}$	12 x 2	14 x 2	9 x 2	12 x 1
9 x 1	12 x $2\frac{1}{2}$	14 x $2\frac{1}{2}$	10 x $1\frac{1}{4}$	12 x $1\frac{1}{2}$
9 x $1\frac{1}{4}$	14 x 2	15 x 3	10 x $1\frac{1}{2}$	12 x 2
9 x $1\frac{1}{2}$	15 x $1\frac{1}{2}$	.....	12 x $\frac{1}{2}$	14 x $1\frac{1}{2}$
9 x 2	15 x 2	.....	12 x $\frac{3}{4}$	14 x 2
10 x $1\frac{1}{4}$	15 x $2\frac{1}{2}$	.....	12 x 1	.....
10 x $1\frac{1}{2}$	15 x 3	.....	12 x $1\frac{1}{4}$	.....
10 x 2	.....	.....	12 x $1\frac{1}{2}$	.....
.....	.....	.....	12 x 2	.....
.....	.....	.....	15 x 2	.....

D 2773.

FELT POLISHING WHEELS.

Diameter of Wheel. Per Dozen.	THICKNESS OF WHEELS IN INCHES.					
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
$1\frac{1}{2}$ inch.	\$ 0.60	\$ 1.00	\$ 1.50	\$ 2.00	\$ 2.75	\$ 3.00
$1\frac{3}{4}$ "	1.00	1.70	2.35	3.00	4.00	4.70
2 "	1.25	2.00	3.00	4.00	5.25	6.70
$2\frac{1}{2}$ "	1.75	2.75	3.75	5.00	7.00	8.00
3 "	2.40	4.00	5.50	7.00	9.50	11.00
4 "	5.25	8.00	11.25	15.00	19.00	24.00
5 "	7.00	11.00	15.00	20.00	28.00	32.00
6 "	12.00	17.00	22.50	30.00	40.00	46.00
7 "	14.50	22.50	35.00	44.00	56.00	64.00

APPROXIMATE WEIGHTS OF FELT WHEELS.
THICKNESS IN INCHES.

Diameter.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	1 in.	$1\frac{1}{4}$ in.	$1\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	2 in.	$2\frac{1}{2}$ in.	3 in.
6 inches.	6 oz.	8 oz.	10 oz.	12 oz.	14 oz.	1 lb.	$1\frac{1}{8}$ lbs	$1\frac{1}{4}$ lbs	$1\frac{3}{4}$ lbs
7 "	8 "	11 "	14 "	1 lb.	$1\frac{1}{8}$ lbs	$1\frac{1}{4}$ "	$1\frac{1}{8}$ "	2 "	$2\frac{1}{4}$ "
8 "	10 "	13 "	1 lb	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	$1\frac{3}{4}$ "	$1\frac{1}{4}$ "	$2\frac{1}{4}$ "	$2\frac{3}{4}$ "
9 "	12 "	1 lb.	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	$1\frac{3}{4}$ "	2 "	$2\frac{1}{4}$ "	$2\frac{3}{4}$ "	3 "
10 "	1 lb.	$1\frac{1}{8}$ "	$1\frac{1}{2}$ "	2 "	$2\frac{1}{4}$ "	$2\frac{3}{4}$ "	3 "	$3\frac{1}{4}$ "	$4\frac{1}{4}$ "
12 "	$1\frac{1}{8}$ "	$1\frac{1}{4}$ "	$2\frac{1}{4}$ "	$2\frac{3}{4}$ "	$3\frac{1}{4}$ "	$3\frac{3}{4}$ "	$4\frac{1}{4}$ "	$4\frac{3}{4}$ "	$5\frac{3}{4}$ "
14 "	.....	.....	$2\frac{3}{4}$ "	$3\frac{1}{4}$ "	$4\frac{1}{8}$ "	$5\frac{1}{8}$ "	$5\frac{3}{8}$ "	$6\frac{1}{4}$ "	$7\frac{1}{4}$ "
15 "	.....	.....	$3\frac{1}{4}$ "	$4\frac{1}{8}$ "	$5\frac{1}{4}$ "	$5\frac{3}{4}$ "	$6\frac{3}{8}$ "	$8\frac{1}{4}$ "	$9\frac{3}{4}$ "
18 "	.....	.....	$4\frac{1}{4}$ "	$6\frac{1}{8}$ "	$7\frac{1}{4}$ "	$8\frac{1}{2}$ "	$10\frac{1}{8}$ "	$12\frac{1}{4}$ "	$13\frac{3}{4}$ "

Any odd size not in above list made up according to order. No sizing used.

D 2779.

SHEET FELT.

No. 1. WHITE. Extra Quality.

In sheets 18 x 18 in.; 3-16, 1-4, 3-8, 1-2, 5-8, 3-4, 1, 1 1-2, 2 in. thick; per lb., \$3.00

No. 2. WHITE.—Hard.

In sheets 18 x 18 in.; 3-16, 1-4, 3-8, 1-2, 5-8, 3-4 inches thick; }
In sheets 36 x 36 in.; 1-4, 1-2, 3-4, 1, 1 1-2, 2 inches thick; } per lb., 2.00

No. 3. WHITE.—Hard.

In sheets 36 x 36 in.; 3-8, 1-2, 5-8, 3-4, 1, 1 1/2, 2 inches thick; per lb., 1.50

No. 4. GRAY.—Hard.

In sheets 18 x 18 in.: 3-15, 1-4, 3-8, 1-2, 3-4, 1, 1 1-2, 2 inches thick; per lb., 1.75

We can cut in squares or strips, as may be desired, at an advance of from 10 to 20 per cent.

D 2780.

UNION CANVAS WHEELS.



Good polishers can make their own canvas wheels by gluing the canvas to required thickness, according to the old method. They make fairly good wheels, too, but the "Union Canvas" that we make are better in every respect. We take the time to get them right. They can't be made up in a hurry, for every wheel must be seasoned to insure flexibility.

We do not glue them, but use a special process of our own, by which we reduce the weight, increase the elasticity and flexibility, and obtain a cloth face, which, combined with the glue, presents a surface that will hold emery better than any other wheel. The first cost is a little more than for the regular glued canvas, but in the end they cost less. They will save their original cost each month in emery, glue and labor.

Compare the results of one of these wheels with the old-style glued canvas, and no other argument will be necessary. We have numerous letters from some of the largest manufacturers in this country, assuring us they have never used wheels giving such excellent results.

Have You Ever Used One?

It will do the work of nearly all the other styles shown in our catalogue. It is the best general wheel for "roughing out" that you can get—also the cheapest. Of a flexible nature, it easily adjusts itself to the irregularities of your work. No skill is required to use it, and there is less tendency to "gouge" your work or spoil design. This wheel will do more work with one "setting up" than any other. It is durable and easily kept in balance.

Diameter.	THICKNESS.				
	1 inch.	1 1/2 inch.	2 inch.	2 1/2 inch.	3 inch.
8 inch	\$1.50	\$2.25	\$2.75	\$3.25	\$4.25
10 "	1.90	2.75	3.60	4.25	5.25
12 "	2.60	3.50	4.50	5.25	6.40
14 "	3.10	4.30	5.40	6.50	7.75
16 "	3.70	5.10	6.25	7.40	8.75

We still have some call for the old style *glued* wheels, and are prepared to make these up to order only as required.

D 2781.

GLUED CANVAS WHEELS.

Diameter.	THICKNESS.				
	1 inch.	1 1/2 inch.	2 inch.	2 1/2 inch.	3 inch.
8 inch.	\$0.85	\$1.50	\$2.10	\$2.75	\$3.60
10 "	1.40	2.10	2.75	3.50	4.50
12 "	2.20	3.20	4.25	4.85	5.85
14 "	2.60	3.60	4.70	5.75	7.25
16 "	3.00	4.20	5.75	6.50	8.25

D 2782.

MUSLIN BUFFS. BLACK PRINTERS' CLOTH.

In sections of 18 pieces.

Diameter, inches.....	9	12	13	14
Price.....	\$0.10	.18	.20	.24

Larger sizes when required.

D 2788

UNBLEACHED MUSLIN BUFFS.—In Sections.

One row of stitching around arbor or riveted.

Diam-eter.	No. Pieces Thick.	Price per Section.	Diam-eter.	No. Pieces Thick.	Price per Section.
6-inch.	18	6 cents	6 inch.	20	7 cents
7 "	"	7 "	7 "	"	8 "
8 "	"	9 "	8 "	"	16 "
9 "	"	12 "	9 "	"	13 "
10 "	"	15 "	10 "	"	16 "
12 "	"	20 "	12 "	"	22 "
13 "	"	22 "	13 "	"	24 "
14 "	"	25 "	14 "	"	27 "
16 "	"	33 "	16 "	"	36 "
18 "	"	40 "	18 "	"	44 "

D 2789.

BLEACHED MUSLIN BUFFS.

Diameter.	No. Pieces Thick.	Price Per Section.	Diameter.	No. Pieces Thick.	Price Per Section.
6 inch.	18	7 cents.	6 inch.	20	8 cents.
7 "	"	8 "	7 "	"	9 "
8 "	"	11 "	8 "	"	12 "
9 "	"	14 "	9 "	"	15 "
10 "	"	16 "	10 "	"	18 "
12 "	"	22 "	12 "	"	24 "
14 "	"	30 "	14 "	"	33 "

D 2790.

CANTON FLANNEL BUFFS.

Diameter.	No. Pieces Thick.	Price Per Section.	Diameter.	No. Pieces Thick.	Price Per Section.
6 inch.	18	13 cents.	12 inch.	18	35 cents.
9 "	"	25 "	14 "	"	40 "
10 "	"	30 "			

In ordering Buffs always give size of arbor hole.

D 2791. PATENT RADIAL THREAD BUFF WHEELS.

DIMENSIONS, WEIGHT AND PRICES.

Diameter in Inches.	Weight in Ounces.	Orders less than 100, per Section.	Orders of 100 and over.
8	7	\$0.14	\$0.13
9	8	.15	.14
12	12	.21	.20
15	20	.36	.35
18	24	.42	.40

Our Patent Wheels are very firm and hard, and hold the polishing material much better than the old style of Buffs and cut down the work much faster. They are about three-eighths of an inch thick, and punched and trimmed ready for use. Their use will save from seventy-five to one hundred and fifty dollars per annum for each Buffer employed. A wheel of any desired width can be made by varying the number of sections. They are made of Bleached Muslin, Unbleached Muslin, and Canton Flannel, and every wheel is warranted to be full weight and of good material. Note their weight and wear in comparison with all others. In ordering send size of hole and diam. of wheel wanted.

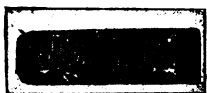
**D 2792. REGULAR RADIAL BUFFS.**

Diam. in Inch.	Unbl'ched Radial.		Bleached Radial.		Duplex Cutter.		Duplex Polisher.	
	100 R.	200 R.	400 R.	500 R.	400 RP.	500 RP.	400 M.	500 M.
10	\$0.11	.10 $\frac{1}{2}$	\$0.11	\$0.15	\$0.12	\$0.16	\$0.12	\$0.16
12	.13	.11 $\frac{1}{2}$	.13	.18	.14	.19	.14	.19
14	.17	.15 $\frac{1}{2}$	.17	.23	.18	.24	.18	.24
15	.18	.17 $\frac{1}{2}$	.19	.26	.20	.27	.20	.27

These prices are on quantity. Lots of 100 or less, add $\frac{1}{2}$ ¢. to price.



POLISHERS', PLATERS' AND GRINDERS' SUPPLIES.



D 2798. TRIPOLI COMPOSITION.

Tripoli Composition is especially adapted for cutting down and polishing brass, bronze, britannia, and other metals preparatory to plating.

Quality T. C. is a very rapid cutter, especially

adapted to brass, copper, etc.

Price, per lb. Bbl. lots....\$0.07½ 100 lbs. \$0.09 Less quantity. \$0.12½

Special prices on quantities named on application.



D 2799. CROCUS COMPOSITION.

Crocus Composition is largely used by stove manufacturers and others desiring to produce smooth finish surface on cast iron and steel.

Quality "C" is a sharp fast cutter for all metals.

Quality "M" is a medium cutter for all metals. Quality "F" is for finishing and coloring on all metals, and does most excellent work.

Price, per lb. Bbl. lots.....\$0.05½

" " 100 lbs......09

" " Less quantity......10

Special prices on quantities named on application.



D 2800. EMERY COMPOSITION.

Nos. 60, 80, 100, 120, 160 and FF. For hard, sharp cutting these goods need no recommendation. Our No. 120, 160 and FF are used by many large bicycle companies with gratifying results. For

quick, smooth work nothing can take their place.

Price, per lb.....\$0.08

Special prices on quantities named on application.

COTTON FLANNEL, MUSLIN AND WOOLEN CLOTH BUFFS.



D 2801.

Stitched or Quilted.

MUSLIN BUFFS.			COTTON FLANNEL.		
Pieces Thick.	Diam., Inches.	Per Dozen.	Pieces Thick.	Diam., Inches.	Per Dozen.
30	2	\$ 1.25	25	2	\$ 1.25
30	2½	1.50	30	2½	1.50
35	3	1.75	30	3	2.00
42	4	2.00	30	4	2.25
50	6	3.50	30	6	4.25
55	8	6.00	30	8	7.00
60	9	7.50	30	9	9.00
65	10	10.00	35	10	12.00
70	12	13.00	40	12	16.00
70	14	16.00	40	14	22.00

Woolen Cloth Buffs same price and thickness as Cotton Flannel Buffs.

**PURE TURKEY EMERY.****D 2807.**Kegs about 300 lbs.
Each.

	4 to 46 lbs.	54 to 180 lbs.	Flour. F FF FFF.
Kegs, per lb.....	\$0.04½	\$0.05	\$0.03
In 10 lb. Tin Cans.....	.06	.06½	.05½
Less quantities.....	.10	.10	.07

**D 2808.**

10 lb. Cans.

D 2809.**EMERY GLUE.**

Glue is a small item in your business, but it is just as important as Emery. Without good glue your emery is wasted, and the time consumed in setting up wheels with poor glue becomes a large item of expense. We do not manufacture Glue, but we have a few grades made especially for this purpose that we know are right.

Shall we send you samples?

Best Emery Glue, "Helmet

Brand".....\$0.22

Finest Emery Glue, "XXXX"......25

Imported Emery Glue, "Square" \$0.18

Pure Powdered Glue, "Rex".... .20

Spike Glue, per lb..... .20

D 2810.**GLUE BRUSHES.**

No. 4.....	Price, each, \$0.60
" 5.....	" " .75
" 6.....	" " 1.00

**D 2811. Nickel Rouge.**

Nickel Rouge, Hard, No. 1. 100 lb. lots.....\$0.22

" " " No. 2. " "16

" " Soft, " "45

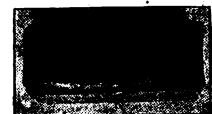
Silver " Hard, " "45

" " Soft, " "45

Gold " Hard, " "60

" " Soft, " "60

" " Jewelers' Extra Fine, per lb..... .80

**D 2812. Gold Rouge.**

Less quantity.....\$0.28

" "20

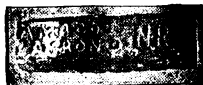
" "50

" "50

" "50

" "70

" "70

D 2813.**SPECIAL WHITE NICKEL COMPOSITION.**

This article is pure white and is used largely for polishing fine nickel, copper, German silver, etc. It has many advantages in embossed and chased work and is perfectly clean. It is used by many of the largest silver plate companies in the United States. We also recommend it for a brilliant, lasting finish on bicycles.

Price, 100 lb. lots.....\$0.22 Less quantity.....\$0.28

Special prices on quantities named on application.

PUTZ EXTRACT.**The Unrivalled Cream Polishing Paste.**

Imported from Germany. It has no equal for polishing brass, signs, railings and show cases, harness, door trimming, and household articles. Why? Because it leaves no unsightly deposit in the letters or scrolls. Because it does not scratch. Because it does not discolor leather. Because it does not injure the most delicately finished woodwork. Because it requires less labor and material to do the work. Because it produces the most lasting and brilliant polish of any preparation on the market. Try it and be convinced. Samples on application.

**D 2814. Paste.**

Medium Cans. Each.....\$0.10 | 1 lb. Cans. Each.....\$0.50
Large " "......15 | 5 lb. " ".....2.00

D 2815. Liquid Extract, in cans, each, ½ Pint..\$0.25 Pint..\$0.50 Quart..\$1.00

**D 2815. Liquid.**

D 2821.

STEAM GLUE POTS.

Polishing rooms are not complete without a good glue pot. These are often home made affairs. We make four sizes and sell them at prices much lower than you can make them for. Each pot rests in a separate heater; these are cast steam chambers through which the steam circulates keeping the glue at an even heat. These steel chambers also avoid all escaping steam. The heaters are fitted with upright arms to support wheel while "setting up" with glue. This allows surplus glue to drop back into the glue plot instead of on the floor. Prices include steam fittings as shown.

No. 1, holding 1 pot.....each, \$ 8.00	No. 3, holding 3 pots.....each, \$20.00
" 2, " 2 pots " 15.00	" 4, " 4 " " 25.00

D 2822.

PUMICE STONE

At Market Rates.

Bonanza
Oil Cups
are Good.

We keep in stock the following sizes:

Powdered.....Nos.	FF, F, 0, 0½, ½, 1.
" " " " " "	1½, 2, 2½, 3, 3½, 4.
Lump.....	Best selected stock.

D 2823.

PURE NICKEL SALTS.

We beg to call attention to our Pure Nickel Salts (sulphate of nickel and ammonia). We not only guarantee this article as purer and stronger in nickel than any in the market, but from our recently improved facilities for manufacturing are enabled to quote very low prices.

We would call your attention to Nickel Salts that contain 15 per cent. or less of Metallic Nickel; this consumers can make themselves by mixing equal parts of our Salts and Sulphate of Ammonia, costing but a few cents per pound.



When Nickel Salts are made from old Anodes and scrap, the solution will not deposit a pure white on dead, unpolished surfaces. In such cases the addition of two or three ounces of our Pure Single Sulphate of Nickel added to each gallon of solution will bring up the color in a surprising manner.

If you compare the color of the Double Nickel Salts that are offered at from one to one and one-half cents below the price of Standard Chemically Pure Salts, you will find a material difference in the color, which is an indication of the metallic strength of the nickel, although not always of its purity. The light color contains an excess of the cheaper ammonia salts.

Salts, Double Sulphate.....	per lb. \$0.24
" Single Sulphate	" .80

D 2824.

VIENNA LIME.

We are supplying the leading stove houses and others with our Powdered Vienna Lime, for polishing matted work. It has none of the objectionable features of the cheaper Crocus Compositions, which are very difficult to remove entirely from the work after polishing, and leave a shade of color that is objectionable.

LUMP.

In 15 and 30 lb. cans. Price, per lb.....	\$0.12
Less Quantities.....	.20

POWDERED.

In 25 and 40 lb. cans. Price, per lb.....	\$0.20
Less Quantities.....	.25

Special prices on quantities named on application.

D 2825.

TRIPLE X LYE.

This Alkali has almost entirely replaced the ordinary Potash and other Caustics for cleaning work from grease. Unlike Potash, that constantly varies in strength, and is most objectionable to handle, the XXX Lye is in small, white crystals, dissolves instantly into a clear solution, and is used about two ounces to the gallon, instead of from six to eight ounces, as with other Lyes. The only cause of complaint is where it is used in the proportion of the commoner Lyes.

400 lb. Casks, per lb.....	\$0.10
100 lb. Cans, " .....	.12
50 lb. " " .....	.13
10 lb. " " .....	.15

D 2831.

PURE CAST NICKEL ANODES.

We furnish but one quality and guarantee results. Below we show some of the sizes in stock with approximate weights, other sizes cast to order at short notice. These Anodes give a pure white deposit, wear away evenly, and maintain a solution in good condition without the constant addition of salts. If you are using other than our Nickel Anodes, and will supply one of your tanks with those of our manufacture (which will be furnished at a special price), we feel confident that you will find an economy in the time of plating your goods, thus saving:

First.—Quantity of solution and tank room required.

Second.—In the constant addition of Nickel Salts that the use of the hard, insoluble Anodes necessitates, and the consequent irregularity of the

strength of solution and irregular thickness of deposit.

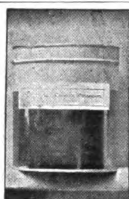
Sizes, inches....	2 x 4 x 3-16	4 x 7 x 3-16	5 x 8 x 1-2	6 x 12 x 1-2	8 x 12 x 1-2
Weight, pounds.	8 oz.	2 1-2	4 1-2	9 1-2	12
Sizes, inches....	8 x 15 x 1-2	8 x 18 x 1-2	8 x 37	12 x 24	
Weight, pounds.	13 1-2	17 1-2	47	36	
Price, per pound.....	\$1.25				

D 2832. CAST ANODES OF ALL METALS ANY SIZE.

Brass Anodes.....	Per lb., \$....	Oroide Anodes.....	Per lb., \$....
Bronze ".....	" " " " " "	Silver ".....	" oz.,
Copper ".....	" " " " " "	Tin ".....	" lb.,
Gold ".....	Per dwt.,		

At Market Rates.

We are now prepared to furnish Aluminum Wire for Anode Hooks. This is an excellent conductor and will not corrode. Write for prices.



D 2833.

CYANIDE POTASSIUM.

Commercial or Fused, per lb.....\$0.60

Chemically Pure, per lb......90

Packed in 5, 10, 25, 50 and 100 pound Tins.

We Cut
Sheet
Brass
Special
Sizes to
Order.



D 2834.

LACQUER.

Kristaline grade W.....	\$6.00
" " K.....	5.00
" White.....	4.00
" Thinner.....	3.50
Lustrine Lacquer.....	2.50
" Thinner.....	2.00

**D 2835. PATENT LACQUER BRUSHES.**

Hard Rubber set and bound. Secured against shrinkage and shedding of hair. Not affected in any manner by the action of hot glue, alcohol, turpentine, benzine, oils or water. Try them.

FITCH HAIR.

Face, inches.....	1	1½	2	2½	3
No. 60, Single Thick, Square, per doz.....	\$3.25	\$4.95	\$6.60	\$8.10	\$9.75
No. 61, " " Chisel, ".....	3.60	5.40	7.20	9.00	10.80
No. 62, Double " Square, ".....	4.05	6.20	8.30	10.35	12.45
No. 63, " " Chisel, ".....	4.50	6.75	9.00	11.25	13.50

CAMEL'S-HAIR.

Face, inches.....	1	1½	2	2½	3
No. 68, Medium.....	\$4.50	\$6.75	\$ 9.00	\$11.25	\$16.20
No. 69, Extra Thick and Long.....	5.10	8.10	10.80	13.50	18.90

D 2835.

C. H. B. & Co. BATTERY No. 1.**E. M. F., 1.8 Volts.**

Price, complete.....	\$5.00	Carbons, pairs.....	\$1.60
Jars, glass, 9x6x8 in.		Carbon Connections..	1.00
deep.....	1.00	Zinc Connections.....	.25
Zincs, heavy rolled...	1.00	Porous Cup.....	.50

An improved Bunsen Cell of great power, for nickel and electro-plating, electro-motors, etc. There are nearly 10,000 of these cells in use, and they are the only battery for nickel plating where the absence of power prevents the use of the Dynamo Machine. The glass jars contain six quarts, forming a very convenient tank for experimental work.

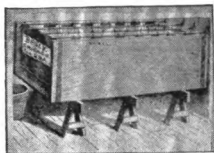
DIRECTIONS.—These Batteries are set up by well amalgamating inside and outside of the zinc; place this in glass jar, inside zinc place porous cup, and within porous cup the carbon; inside the porous cup pour nitric acid. In the outer jar pour a mixture of one part oil of vitriol to twelve parts water (previously mixed and allowed to cool) to cover the zinc or on level with liquid in porous cup. When the outer liquid becomes milky, withdraw it with syringe or siphon and refill, adding occasionally small quantities of nitric acid to porous cup, and keep zinc thoroughly amalgamated. We supply battery salts to use in place of the diluted oil of vitriol, avoiding the necessity of amalgamating the zinc, using about two pounds, leaving some undissolved; price, 5 cents per pound. This avoids the danger of having mercury around gold work. Glass strips may be placed between porous cup and zinc, to prevent contact. Electroplating fluid may be substituted for nitric acid. Amalgamating zinc is best done as follows: Dip in lye to remove grease, rinse, then dip in the dilute acid in glass jar, and then brush over with about two ounces of mercury "quick-silver" contained in a little flannel bag.

D 2836. ROD AND WIRE CONNECTIONS, No. 1.

We have recently improved these connections, and now offer them with reverse tops for connecting wires. We have in stock the following sizes:

For $\frac{1}{4}$ inch rods, price, each.....	\$0.25
" $\frac{3}{8}$ " " " " " .....	.25
" $\frac{1}{2}$ " " " " " " .....	.30
" $\frac{5}{8}$ " " " " " " .....	.40
" $\frac{3}{4}$ " " " " " " .....	.40
" 1 " " " " " " .....	.50
" $1\frac{1}{4}$ " " " " " " .....	.60

D 2837.

**WOOD TANKS.**

These are carefully made from the best kiln-dried stock. They are securely put together with iron bolts, and thoroughly well lined. These tanks are all tested before leaving our factory. Our prices are not quite so low as those for which an inferior article can be made, as we believe it is poor economy to use anything but the best for the purpose. These can be made of

any size or shape, but we show a few sizes which are generally kept in stock.

INSIDE MEASUREMENT.

Capacity. Gallons.	Length. Inches.	Width. Inches.	Depth. Inches.	Capacity. Gallons.	Length. Inches.	Width. Inches.	Depth. Inches.
10	20	9	13	125	60	24	20
20	30	15	12	175	60	30	24
30	35	14	14	175	72	24	24
50	48	18	16	225	72	24	30
75	60	18	16	250	60	36	30
100	72	18	18	325	72	30	36

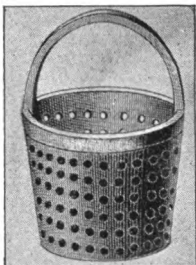
We can furnish these or cylindrical tanks of cedar of any size.

We recommend our prepared Asphaltum for lining tanks. Put up in boxes, kegs, and barrels. Prices quoted on application.

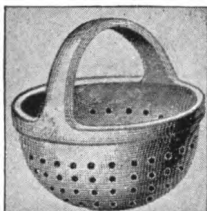
**D 2838. CLEANING COMPOUND.**

In many classes of work it is very difficult to remove the remains of the polishing material without much labor, and, while we make all our polishing materials to work as clean as possible, we recommend this as a saving of labor; it avoids the

use of the dangerous naphtha, wood alcohol, etc. This material is used half pound or less to the gallon of hot water; when dissolved, immerse the articles for five or six minutes, using a stiff brush when necessary. Packed in Tins, Kegs, or Barrels. Special prices on quantities named on application.

EXTRA GLAZED STONEWARE DIPPING BASKETS.**D 2845. No. 1.**

Capacity.	Size in inches.	Price, each.
1 gallon.....	6 $\frac{3}{4}$ x 7 $\frac{3}{4}$ deep.....	\$0.75
1 $\frac{1}{2}$ "	7 x 8 "	1.00
2 "	8 x 9 "	1.25

**D 2846. No. 2.**

D 2846. No. 2.
Size in inches, 9 x 5
deep. Price, each. \$1.00

**D 2847. No. 3.**

D 2847. No. 3. Size in inches, 9 x 5 deep. Price, each\$1.00

**D 2848. No. 4.****D 2848. No. 4.**

Capacity.	Size in inches.	Price, each.
$\frac{1}{4}$ gallon.....	5 x 3 deep.....	\$0.65
1 $\frac{1}{2}$ "	6 x 3 $\frac{1}{2}$ " .....	.80
1 "	8 x 5 "	1.00
1 $\frac{1}{2}$ "	9 x 6 "	1.25

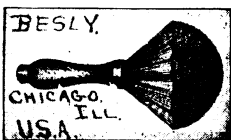
As we employ careful packers we cannot
be responsible for breakage
in transportation.

Try our
Brush
Copper fo
Electrical
Work.

D 2849. COPPER OR BRASS WIRE DIPPING BASKETS.

These baskets will be found desirable when a large quantity of small work is to be plated, as the wiring can be dispensed with, which is often the greatest expense in plating small articles.

No. 1, 6 in. diameter, 8 in. deep.....	each, \$2.50
No. 2, 4 " " " 7 " "	" 2.00
No. 3, 6 " wide, 8 in. long, 3 in. deep....	" 3.00

D 2850. PLATERS' LATHE GOBLET SCRATCH BRUSHES.

Diam.	Row.	Block.	Bristle.	Price, per dozen.
2	6	$\frac{3}{8}$	\$ 5.00	\$10.00
2 $\frac{1}{2}$	7	1	7.50	12.00
3	8	1 $\frac{1}{8}$	10.00	15.00
3 $\frac{1}{2}$	10	1 $\frac{1}{4}$	12.00	18.00
4	10	1 $\frac{1}{2}$	14.00	22.00
5	10	2	16.00	26.00

D 2851. END BRISTLE BRUSHES (For Jewelers).

Diameter of Head.	Length of Bristle.	Price Per Doz.	Diameter of Head.	Length of Bristle.	Price Per Doz.
$\frac{3}{8}$	$\frac{3}{8}$	\$0.70	$\frac{3}{4}$	1 $\frac{1}{8}$	\$0.90
1 $\frac{1}{2}$	1	.70	$\frac{3}{8}$	1 $\frac{1}{8}$	1.00
$\frac{5}{8}$	1	.80	1	1 $\frac{1}{8}$	1.15

D 2852. THIMBLE BRUSHES.

Length of Stock.	Cut.	Price Per Doz.
Fine Brass, Crimped.....	2 $\frac{1}{2}$ in. 1 $\frac{1}{4}$ in.	\$2.50

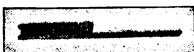
D 2853. HAND WIRE SCRATCH BRUSHES.

	Brass Wire.	Steel Wire.
Gold Brushes, of wire No. 38, per bundle.....	\$0.85	\$1.10
Half-Meister, " No. 39, "	1.05	1.40
Meister, " No. 40, "	1.25	1.75

Each grade of above Brushes can be had in 1, 2, 3, 4, 6 bunches to a full bundle of 8 ounces.



		2 Row	3 Row	4 Row	5 Row	6 Row
Hand Brushes, Hinnen.	Price, each.....	\$0.13	\$0.15	\$0.20	\$0.25	\$0.30
"	" Glasgow, " " .....	.15	.20	.25	.30	...
"	" Garantie, " " .....	.15	.20	.25	.30	...
"	" Goat's Hair, extra soft, fine... ..	...	.20	.25	...	...
"	" Bone Handle, for washing... ..	...	.15	.20	...	...



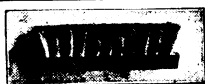
		PLATERS' HAND BRUSHES.				For Useful
		D 2859. STRAIGHT HANDLE.				Tables, see
						Back of
						Book.
Rows.		Brass.	Steel.	Bristle.	Mixed.	
1	Price, per dozen			\$1.50	\$1.25	
2	" " "	\$4.00	\$4.00	2.00	1.75	
3	" " "	5.00	5.00	2.75	2.00	
4	" " "	6.00	6.00	3.25	2.50	
5	" " "	7.00	7.00	4.00	3.00	
6	" " "	8.50	8.50	4.50	3.50	



D 2860.					D 2861.				
Rows.	Price, per dozen.				Brass.	Steel.	Bristle.	Mixed.	
1	"	"	"	"	\$1.50	\$1.25	
2	"	"	"	"	\$4.00	\$4.00	2.00	1.75	
3	"	"	"	"	5.00	5.00	3.00	2.00	
4	"	"	"	"	6.00	6.00	3.50	2.50	
5	"	"	"	"	7.00	7.00	4.25	3.00	
6	"	"	"	"	8.50	8.50	4.75	3.50	



Rows.		Brass.	Steel.	Bristle.	Mixed.
1	Price, per dozen.....			\$1.75	\$1.25
2	" " ".....	\$4.00	\$4.00	2.25	1.75
3	" " ".....	5.00	5.00	3.00	2.25
4	" " ".....	6.00	6.00	3.50	2.75
5	" " ".....	7.00	7.00	4.25	3.00
6	" " ".....	8.50	8.50	4.75	3.50



	FLAT SCOURING BRUSHES.	
D 2863. Flat.	Tampico.	D 2864. Round.
Flat, 5 rows, 12 knots long, per dozen.....		\$1.00
" 4 " 18 " "		1.50
Round, 5 rows, 14 knots long, per dozen		1.75



D 2865. POINTED SCOURING BRUSHES.
Tampico.
 5 rows, 14 knots long, per dozen.....\$1.25



2 rows, per dozen.....	\$1.50
3 " " "	2.00
4 " " "	2.50
6 " " "	3.50

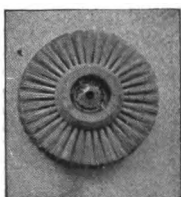


6 inch, per dozen.....	\$4.00
8 " " "	5.00
18 " " "	6.00



Per dozen.....\$6.00

IMPROVEMENT IN BRUSHES.



Owing to the constant demand from consumers of brushes, bristle, brass, steel, German silver, etc., for jewelers, watch-case manufacturers, silverware manufacturers, electro-platers, and others, we have been forced to fit up a complete department for their manufacture, and shall esteem it a favor to quote prices. If you will send sizes of block, hole, and total diameter, and, if wire, size of same, or an old brush showing the above, we shall be glad to furnish sample and prices that will prove economical.

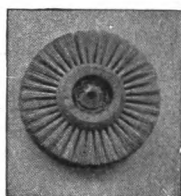
D 2874. PLATERS' CIRCULAR SCRATCH AND SATIN FINISH BRUSHES.

For heavy use, made very strong, of coarse Brass and Steel Wires from No. 39 Brown & Sharpe's Gauge, and coarser. Centers filled with lead.

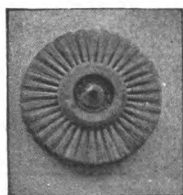
Diameter.	1 Row. Per Dozen.	2 Row. Per Dozen.	3 Row. Per Dozen.	4 Row. Per Dozen.	5 Row. Per Dozen.
2½ inches.	\$ 2.50	\$ 3.75	\$ 5.00	\$ 7.00	\$ 9.00
3 "	3.00	4.50	6.00	8.00	10.00
3½ "	4.50	7.00	9.00	12.00	15.00
4 "	6.00	9.00	12.00	16.00	21.00
4¼ "	6.50	10.50	13.50	18.50	24.00
4½ "	7.00	11.50	14.50	20.50	27.00
4¾ "	7.50	12.00	15.00	22.00	29.00
5 "	8.00	13.00	16.50	24.00	32.00
5½ "	9.00	15.00	18.50	27.00	36.00
6 "	10.50	16.50	21.50	30.00	39.00
6½ "	11.00	19.00	24.00	36.00	42.00
7 "	12.00	21.00	27.00	40.00	48.00
7½ "	13.00	24.00	30.00	44.00	54.00
8 "	14.00	25.00	33.00	48.00	60.00

D 2875. JEWELERS' CIRCULAR SCRATCH BRUSHES.

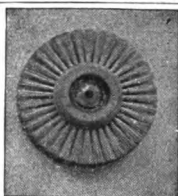
Providence and Attleboro styles of Fine Wires, from No. 40 to finest.



Diameter.	1 Row. Per Dozen	2 Row. Per Dozen	3 Row. Per Dozen	4 Row. Per Dozen
2 inches.	\$ 2.00	\$ 3.50	\$ 4.50	\$ 6.00
2½ "	2.50	3.75	5.00	7.00
2¾ "	2.75	4.00	6.00	8.00
3 "	3.00	4.50	6.50	9.00
3¼ "	4.00	6.00	8.00	11.00
3½ "	5.00	7.00	9.00	14.00
4 "	6.00	9.00	12.00	18.00
5 "	8.00	12.00	16.00	22.00
6 "	10.00	16.00	20.00	28.00

**BRISTLE and
TAMPICO
WHEEL
BRUSHES.**
**D 2876.**

Diam. of Brush Inch.	No. of Rows.	Size of Hub. Inch.	QUALITY.		
			A. Pure Stiff Bristle. Black or Gray.	B. Mixed Bristle.	C. Tampico. Black, White, Gray.
5	1	2	\$ 4.00	\$ 3.25	\$ 2.00
5	2	2	5.00	4.50	3.00
5	3	2	7.00	6.00	4.00
5	4	2	9.00	7.50	5.00
6	1	2¾	4.50	3.50	2.50
6	2	2¾	6.00	5.50	3.50
6	3	2¾	9.00	7.00	4.50
6	4	2¾	12.00	8.50	5.50
6	5	2¾	15.00	10.00	6.50
6	7	2¾	18.00	14.00	8.00
8	4	5	14.00	13.50	7.00
8	5	5	18.00	17.00	8.00
8	6	5	24.00	22.00	9.00
8	7	5	30.00	26.00	10.00
8	8	5	40.00	30.00	12.00
9	6	6	34.00	30.00	12.00
10	6	7	40.00	34.00	12.50
12	6	8	50.00	38.00	15.00



D 2882.

BRISTLE WHEEL BRUSHES.

For Silversmiths, Jewelers and Platers.

Price, per dozen.

When ordering give size of hole.

Diameter of Brush.	Number of Rows.	Size of Hub.	QUALITY.		
			XX. Extra Stiff White Bristle.	A. Extra Stiff Bristle. Black or Gray.	B. Medium Bristle.
2 inches.	1	$\frac{7}{8}$ inches.	\$0.95	\$0.80	\$0.70
2 "	2	$\frac{7}{8}$ "	1.75	1.50	1.50
2 "	3	$\frac{7}{8}$ "	3.50	2.50	2.50
2 "	4	$\frac{7}{8}$ "	4.00	3.25	3.00
$2\frac{1}{2}$ "	1	1 "	2.00	1.25	1.00
$2\frac{1}{2}$ "	2	1 "	3.00	2.00	1.75
$2\frac{1}{2}$ "	3	1 "	3.50	2.75	2.50
$2\frac{1}{2}$ "	4	1 "	4.00	3.25	3.00
3 "	1	$1\frac{1}{4}$ "	2.25	1.75	1.50
3 "	2	$1\frac{1}{4}$ "	3.00	2.25	2.00
3 "	3	$1\frac{1}{4}$ "	3.75	3.00	2.75
3 "	4	$1\frac{1}{4}$ "	4.50	4.00	3.50
$3\frac{1}{2}$ "	1	$1\frac{3}{4}$ "	2.50	2.00	1.75
$3\frac{1}{2}$ "	2	$1\frac{3}{4}$ "	3.50	2.50	2.25
$3\frac{1}{2}$ "	3	$1\frac{3}{4}$ "	5.00	3.50	3.00
$3\frac{1}{2}$ "	4	$1\frac{3}{4}$ "	6.00	5.00	4.00
4 "	1	$2\frac{1}{4}$ "	4.00	3.50	3.00
4 "	2	$2\frac{1}{4}$ "	5.50	4.50	4.00
4 "	3	$2\frac{1}{4}$ "	7.00	6.00	5.50
4 "	4	$2\frac{1}{4}$ "	8.00	7.00	6.50



D 2883. SATIN FINISH WIRE BRUSHES.

Finest Composition Wires.

Special Drills, Made to Order.

Heavy Brass, Steel and German Silver Wires.

Diameter.	Rows.	Block.	Price, Per Dozen
6 inches.	1	2 inches.	\$ 7.50
6 "	2	2 "	12.50
6 "	3	2 "	15.00
6 "	4	2 "	19.50

Diameter.	Rows.	Block.	Price, Per Dozen.	Diameter.	Rows.	Block.	Price, Per Dozen.
8 inches.	1	3 inches.	\$ 8.50	8 inches.	3	3 inches.	\$17.50
8 "	2	3 "	14.00	8 "	4	3 "	21.00

D 2884.

SATIN FINISH OR STAR BRUSHES.

Made from German Silver Wire.

Diameter.	Rows.	Block.	Per Dozen.	Diameter.	Rows.	Block.	Per Dozen.
8 inches.	1	2 inches.	\$ 7.50	8 inches.	3	2 inches.	\$15.00
8 "	2	2 "	11.00				



D 2885. CUP-SHAPE BRUSHES.

For Watch Cases.

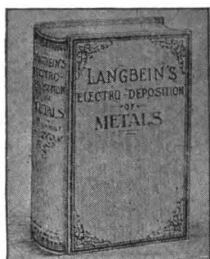
2 Row, $1\frac{1}{8}$ inch	Black, Brass or Steel, per doz.,	\$6.00
2 " $1\frac{1}{8}$ "	Extra Stiff Bristle, "	4.00
2 " $1\frac{1}{8}$ "	Soft Bristle, "	3.00



D 2886. INSIDE LATHE BRUSHES.

Silversmiths' Bristle.

No. of Rows.	Size of Center Block.	Diam. of Brush.	Length of Bristles.	Length of Handle.	Price, Per Dozen.
2	$\frac{3}{4}$ in.	$2\frac{1}{4}$ in.	$\frac{3}{4}$ in.	$3\frac{1}{2}$ in.	\$2.25
2	1 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	$3\frac{1}{2}$ "	2.50
3	1 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	$3\frac{1}{2}$ "	3.50
3	1 "	3 "	1 "	$3\frac{1}{2}$ "	3.75

D 2892. STANDARD BOOKS ON ELECTRO-PLATING.**Langbein's New and Splendid Book on the Electro-Deposition of Metals.**

Edition of 1894. Translated from the German of Dr. George Langbein, with additions by William T. Brannet. A complete treatise, comprising Electro-Plating and Galvanoplastic Operations, the Deposition of Metals by the Contact and Immersion Processes, the Coloring of Metals, the Methods of Grinding and Polishing, as well as Descriptions of the Electric Elements, Dynamo-Electric Machines, Thermopiles, and of the Materials and Processes used in every Department of the Art. Illustrated by 125 engravings. In one Volume, 8vo. 404 pages.

CONTENTS.—General Historical—Theoretical Part—Sources of Current—Practical Part—Processes of Electro-Deposition—Deposition of Nickel and Cobalt—Deposition of Copper, Brass and Bronze—Deposition of Silver—Deposition of Gold—Deposition of Platinum and Palladium—Deposition of Tin, Zinc, Lead and Iron—Deposition of Antimony, Arsenic and Aluminum—Galvanoplasty—Coloring, Platinizing, Oxidizing—Lacquering of Metals—Apparatus and Instruments—Hygienic Rules—Chemical Products used in the Electro-Plating Art—Useful Tables. Price, \$4.00. Postage paid to any part of the world.

MODERN ELECTRO PLATING.

The little pamphlet, "Practical Points on the Deposition of Metals," is now out of print and can no longer be furnished. It was so warmly received and its author has been so repeatedly asked for more information on the subject of plating, that it has been thought best to cover the whole subject in a clear and comprehensive way that will enable a workman, student or apprentice to understand sufficient of the principles and practice to intelligently consult other books, which treat the same subjects in the old way, and to enable him to see into the mysteries of formulas so that he can work out of his troubles without continually appealing to others for assistance. The idea of enabling a man to dispense with formulas may seem startling to old platers, and while it cannot be done in all instances, yet it is the usual working practice of all who become skilled in special branches, so that they recognize the conditions solely by the appearance of their work and modify the baths to meet the requirements, without following set rules. To enable any plater of moderate skill and experience to do this is the idea of the author.

The principles involved in depositing gold, silver, nickel, copper, brass and other metals by means of batteries and dynamos; the preparation of work for plating; composition and management of plating baths; methods of finishing work, etc. By J. H. VAN HORNE. Cloth, illustrated, \$1.00.

WATT'S ELECTRO-METALLURGY.


By ALEXANDER WATT, F. R. S. S. A. Price, \$1.00. Postage paid.

**Special
Taps
Made to
Order.**

BRANNET'S METALLIC ALLOYS.

A new, revised and enlarged edition. The most complete and valuable treatise in the English language. Just ready.

THE METALLIC ALLOYS:—A practical guide for the manufacture of all kinds of alloys, amalgams and solders used by metal workers, together with their chemical and physical properties and their application in the arts and the industries, with an appendix on the Coloring of Alloys, and the Recovery of Waste Gold, Silver and Other Metals. By Wm. T. Brannet, author of "The Metal Worker's Handy Book of Receipts and Processes," and editor of "Langbein's Complete Treatise on the Electro-Deposition of Metals." Second edition, revised, enlarged and illustrated, in one volume, 8vo., 550 pages. Price, \$5.00, by mail, free of postage, to any address in the world, or by express, C. O. D., freight paid to any address in the United States, \$5.00.

 A circular of four pages quarto, showing the full table of contents of the above volume, sent free of postage to anyone in any part of the world who will furnish his address.

D 2893.**ELECTRO-PLATING CHEMICALS.****Carbonates, Sulphates, Chlorides, etc.**

We can furnish all the chemicals in general use for plating, and keep a complete line constantly in stock. These are put up in convenient packages. We can guarantee their purity, and you will find our prices are right.

Carbonate Ammonia.

" Copper.

" Nickel.

" Potash.

" Soda.

" Zinc.

Acetate Copper.

Sulphate Ammonia.

" Copper.

" Iron.

" Nickel.

" Potash.

" Zinc.

Sulphuret Potash.

Chloride Ammonia.

" Gold.

" Nickel.

" Silver.

Cyanide Copper.

" Potash.

" Zinc.

**ELECTRO-PLATERS' CHEMICALS, ETC., OF BEST QUALITY AT THE
D 2895. LOWEST MARKET RATES.**

Amyl, Acetate.	Copper, Acetate (pure distil'd Verdigris).	Pearl Ash.
" Alcohol.	" Carbonate.	Pitch.
Acid, Acetic, in bottles and carboys.	" Cyanide.	Platinum, Chloride Sol.
" Boracic.	" Oxide.	" " Dry.
" Benzoic.	" Chloride.	" Foil and Wire.
" Carbolic, Crystals.	" Sulphate, pure.	Potash (Cleansing Com- pound), 1st sorts.
" Chromic.	" Granulated.	" Acetate.
" Citric.	Crucibles, Sand.	" Bichromate.
" Gallic.	" Black Lead.	" Carbonate.
" Hydrocyanic.	Chloroform.	" Caustic, White.
" Hydrofluoric.	Cobalt, Metal.	" Chlorate.
" Dipping.	" Peroxide.	" Permanganate.
" Muriatic, carboys and bottles.	" Carbonate.	" Sulphuret.
" Muriatic, chemi- cally pure,	" Chloride.	Potassa, Prussiate, Red.
" Nitric, carboys and bottles.	" Nitrate.	" " Yellow.
" Nitric, chem. pure.	" Sulphate.	Potassium, Cyanide.
" Oxalic.	Collodion.	" " chem. pure, any quan.
" Prussic.	" Dial Varnish.	Phosphorus.
" Sulphuric (Oil Vit- riol).	Compositions, for Pol- ishing.	Potash Kettles & Tanks.
" Sulphurous.	" " Emery Cake.	Potty Powder.
" Tartaric, Crystals.	" " Tripoli, White.	Rouge, Hard and Soft, for Gold.
" " Powd.	" " Tripoli, Pink.	" Hard and Soft, for Silver.
Alcohol, 95 per cent.	Crocus.	" Hard and Soft, for Nickel.
" Wood, extra qual.	Copperas.	" Hard Black, for Horn and Jet.
Alum, Lump.	Cream Tartar.	Rosin.
" Ground.	Distilled Water.	Rotten Stone, Powdered.
" Powdered.	Emery, Grain, all Nos.	" " Lumps.
Aquafortis, bottles and carboys.	" Flour, "	Silex, Ground.
Aluminum, Metal.	" " ext. washed.	Silver, for Anodes.
Amalgamating Solution	Ether, Sulph.	" Nitrate.
Ammonia, Aqua, bottles and carboys.	Electric Batteries.	" Sol., any quantity.
" Carbonate.	Fusel Oil.	Sand, Buffing Comp.
" Hydrosulphuret.	Filtering Paper.	Soda, Acetate.
" Chloride (Sal Am- monia).	Glue.	" Ash.
" Nitrate.	Glycerine.	" Bicarbonate.
" Sulphate.	Gold, for Anodes.	" Bisulphite.
" Oxalate.	" Chloride.	" Caustic.
" Bichromate.	" Sol., any quantity.	" Hyposulphite.
Antimony, Metal.	Galvanometers for elec- tric currents.	" Silicate.
" Chloride.	Gum Shellac.	" Phosphate.
" Oxide.	Hydrometers.	" Pyrophosphate.
" Powdered.	Hone, trimmed.	Stearic Acid.
Asphaltum.	" original casks.	Soapstone, Powdered.
Asbestos in sheets.	Iron Sulphate.	Stone Jars and Pitchers.
Arsenic, Powdered.	Kristaline Dip Lacquer.	Spirit Ammonia,
" Lump.	Litmus Papers.	Sugar of Lead.
Battery Jars, all kinds.	Lime, Chloride.	Tin, Metal.
Bismuth, Metal.	" Vienna, in cans.	" Chloride.
Benzole.	Lacquers, Patent Cold.	" " Fused.
Bone Ash.	Lead, Acetate.	" Oxide.
Blue Vitriol (Sulphate Copper).	" Black.	" Cyanide.
Borax, Lump.	Litharge.	" Solution
" Powdered.	Lye, XXX, substitute for potash.	Tripoli, German.
" Calcined.	Magnesia, Calcined.	Varnishes.
" Glass.	" Carbonate.	" Colored for Tinware.
" Slate.	" Oxide.	Vienna Lime.
Brass, Rolled or Cast for Anodes.	" Borate.	Walrus Leather.
" Solution.	Mercury, Metallic.	" Wheels.
Boxwood Sawdust.	" Cyanide.	Whale Oil Soap.
Brick-dust.	Nickel, Arseniate.	Zinc, Acetate.
Bronze Anodes.	" Bromide.	" Carbonate.
" Solutions.	" Carbonate.	" Chloride,
Copper Solutions.	" Chloride.	" Cyanide.
" for Anodes.	" Grain.	" Oxide.
" Wire, all numbers.	" Anodes, improved.	" Sulphate.
" Rods and Tubing.	" " rolled.	" Rolled Metallic for Batteries of all Sizes.
	" Nitrate.	Leclanche.
	" Sulphate.	
	" Sulph. and Ammo- nia (nickel salts).	
	" Acetate.	
	Paraffine.	

Helmet Oil
Lubricates
Anything.

No.
2.



No.
3.



No.
4.



No.
5.



No.
6.



No.
7.



No.
8.



No.
9.



No.
10.



UNFINISHED BRASS PERFECTION OIL CUPS.

TESTIMONIALS.

Messrs. Charles H. Besly & Co., Chicago, Ill.

GENTLEMEN:—I have taken due notice of yours of the 4th inst. in reference to "Helmet Oil and Perfection Oil Box." I find we have, say 125 to 150 of these Boxes in constant use. We buy the Helmet Oil when we buy any, but it takes so little to run the Boxes that we do not have to buy but a few pounds each year. It comes very near solving the old problem of "getting something for nothing," and we are now looking around the places to find where we can use more of these marvelous economizers. Yours truly,

CHAS. F. BROOKER,
Pres. Coe Brass Mfg. Co.,
Torrington, Conn., U. S. A.

Jan. 10, 1897.

This will certify that I have used Helmet Oil and Perfection Oil Cups. I have made experiments with nearly every grease in the market, none of which equals Helmet Oil. It will effect a great saving in oil, labor and wear of machinery. Helmet Oil does its work in a solid state. I take pleasure in recommending it to all users of machinery. You may count me as a customer. Yours truly,

DANIEL BEST.

OFFICE OF JACOB PRICE, Manufacturer of Traction Engines and Hay Presses.

RACINE, Wis., Sept. 20, 1896.

C. H. Besly & Co., Chicago, Ill.

GENTLEMEN:—I consider your Perfection Oil Cups and Helmet Oil an absolute necessity on my Engines. With a machine fully equipped with these safety lubricating appliances the risk of hot bearings is reduced to the lowest possible point. I do not consider it safe or prudent to put out a machine without them.

Yours, etc.,

JACOB PRICE.

MINNEAPOLIS UNION ELEVATOR Co., Capital \$600,000.

MINNEAPOLIS, Minn., Nov. 11, 1896.

Messrs. C. H. Besly & Co., Chicago, Ill.

DEAR SIRS:—In regard to your Perfection Cups and Helmet Solid Oil, we have had 360 cups in use for the past two years, and have used about seven pounds of Helmet Oil per month. We find your Helmet Oil far superior to any other Solid or Liquid Oil in the market, and that it gives entire satisfaction.

Yours truly,

G. H. McDOWELL, Supt.,
Union Elevator Co.

PRICE OF UNFINISHED BRASS PERFECTION OIL CUPS.

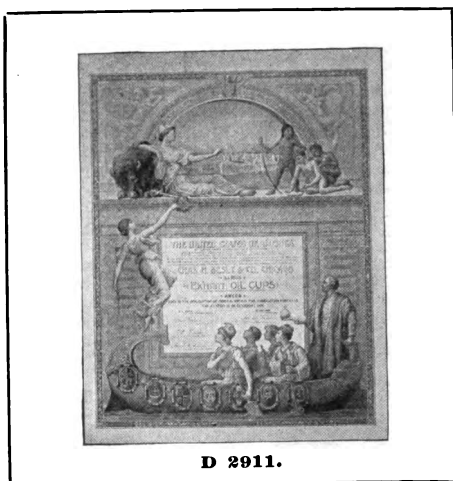
No.	2	3	4	5	6	7	8	9	10
Diam. of Cup, in.	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$	$3\frac{3}{8}$	4	5
For Shaft, in.	$\frac{3}{4}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{3}{4}$	6	8
Threaded Pipe									
Thread	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
Unfinished Brass	0.50	0.65	0.85	1.20	1.50	1.75	2.20	2.95	3.95

For directions for placing Helmet Oil on shafting, etc., see page 272.

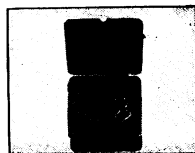
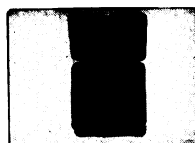
D 2905. Cuts 1-4 Size.

No.
2.No.
3.No.
4.No.
5.No.
6.No.
7.No.
8.No.
9.No.
10.

D 2911. Cuts 1-4 Size.



D 2911.

HIGHEST AWARD, COLUMBIAN EX-
POSITION, 1893.

D 2911.

PRICE OF PERFECTION FINISHED BRASS
OIL CUPS.

No.	2	3	4	5	6
Diam. of Cup, inch.	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{3}{4}$
For Shaft, inches...	$\frac{3}{4}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$
Threaded Pipe Thread	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Finished Brass (polished), each.....	\$1.00	\$1.10	\$1.25	\$1.55	\$1.90

PRICE OF PERFECTION FINISHED BRASS
OIL CUPS.

No.	7	8	9	10
Diameter of Cup, inches.	$2\frac{3}{4}$	$3\frac{3}{4}$	4	5
For Shaft, inches.....	$3\frac{1}{2}$	$4\frac{3}{4}$	6	8
Threaded Pipe Thread...	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
Finished Brass (polished) each	\$2.50	\$2.80	\$3.70	\$4.65

For directions for placing Helmet Oil on shafting, etc., see page 272.

No.
1.



No.
2.



No.
3.



No.
4.



No.
5.



No.
6.



No.
7.



D 2918. Cuts 1-4 Size.

HELMET OIL.

For direction for placing Helmet Oil on
Shafting, etc., see page 272.



BONANZA OIL CUP.

Milling
Cutters
Made for
Bicycle
Work.

To be Used with Helmet Oil.

Best Cup made. The Cap is spun brass.

It is stiff. It won't dent. It is light. It is strong. It won't leak. It won't break. It will suit you.

With Helmet Oil it will lubricate anything.

PRICE OF BONANZA OIL CUPS.

Number.....	1	2	3	4	5	6	7
Diameter of Cup, inches.....	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{4}$	$2\frac{3}{4}$
For Shaft, inches.....	$\frac{3}{4}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$
Threaded Pipe Thread.....	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$
Price, each.....	\$1.10	\$1.10	\$1.10	\$1.25	\$1.55	\$1.90	\$2.50



HELMET OIL.

A Solid Oil. The Cheapest, Purest and Best Lubricant Known. Adapted for Use on All Kinds of Machinery.

Contains no Acid or Pitch, therefore never injures Bearings.

Will Not Melt at less than 180 to 200 degrees F. Hence will not run out of the bearings and injure cotton, silk, flour or other valuable articles of manufacture, and can be used in hot climates, or in especially heated positions on gas engines, etc.

Will Not Freeze, and can be used ANYWHERE.

Will Not Clog Nor Gum, as it contains no pitch, nor anything but useful lubricating matter.

Can Be Applied in Any Position.

It Is Cleanly. Being practically heat-proof it will not melt and drop from the boxes smearing the floor, the machinery, and everything with which it comes in contact. It has no offensive odor.

Is a Sure Preventive of Hot Boxes.

Is Cheapest Lubricant Known. As it does not melt, there is ABSOLUTELY NO WASTE from running out of the bearings; does not spatter over valuable merchandise; does not rot the belts or make them slippery; thus SAVES POWER, SAVES the TIME of the engineer in sopping up oil, SAVES WIPING WASTE. Lasts a long time, as it adheres to the bearings. LUBRICATES ONLY WHEN SHAFT IS IN MOTION. Besides above, it makes **an average saving of 50 per cent.** in material used.

An intelligent conception of its wonderful lubricating qualities is gained only by practical use. Experience has proved HELMET OIL is best under all circumstances, and far superior to any other Oil in the market.

GUARANTEE ON THIS OIL.

All parties desiring to try this Oil can, by applying to any of our Agents, or direct to House, receive sample Cup and Oil for ten days' trial, and if not perfectly satisfied that it saves 50 per cent. over any soft oil in market, may return it to Agent, and no charge will be made for oil used in trial.



D 2924.

PRICE IN TIN CANS, PER CAN.

1 lb.	3 lbs.	5 lbs.	10 lbs.
\$0.50	\$1.50	\$2.25	\$4.25

PRICE [IN PACKAGES OF ABOUT

28 lb. Pail.	60 lb. Tub.
\$0.40 per lb.	\$0.39 per lb.



D 2930. HELMET OIL FOR BICYCLES.

Comes in Tubes of a convenient size for tool bag. One dozen tubes on a card; *one gross in box.*

DIRECTIONS.—Clean out dirt and use just enough HELMET OIL to cover friction surfaces.

Price, per dozen\$1.50 | Price, per gross\$15.00



D 2931. HELMET CHAIN GREASE.

Comes in Tubes of a convenient size for tool bag. One dozen tubes on a card; *one gross in box.*

DIRECTIONS.—Clean out dirt and use just enough HELMET CHAIN GREASE to cover friction surfaces.

Price, per dozen\$1.50 | Price, per gross\$15.00

D 2932. HELMET OIL FOR CARRIAGE USE.

Economy { It requires the smallest quantity of oil, can be applied to axle with a common paint brush. Runs from 40 to 75 per cent. further than any other oil in use, with perfect safety.

Cleanliness { So little oil is used that none works out at the end of spindles, contains no acid or pitch. Is especially adapted for hot climates.

References { Vendome Livery Stable, San Jose, California.
 Empire & Patterson " " Modesto, "
 Hunter St. & Carlin " " Stockton, "
 City Cab Co., " "
 Stockton Cab Co., " "



The shape of this can is well adapted to go under seat of carriage, and as HELMET OIL does not melt or freeze it is always handy in case of accident to have HELMET OIL with you.

HELMET CARRIAGE OIL put up in cans convenient for carriage use \$2.00 per dozen.

Sample can mailed to any address post paid for 25 cents.

Directions for Applying Helmet Carriage Oil.

Before using HELMET OIL, axle must be clean and free from all other oils and preparations. Apply with a common small paint brush a thin coating entirely over the axle. Keep spindles well washed up to prevent chucking noise. A trial will convince the most skeptical.


D 2938. DRILL LIST FOR MACHINE SCREW TAPS.

Size Tap.	Size Drill.	Size Tap.	Size Drill.	Size Tap.	Size Drill.	Size Tap.	Size Drill.	Size Tap.	Size Drill.
1, 56	54	5, 36	39	10, 24	27	15, 18	10	20, 16	C
1, 60	54	5, 40	38	10, 30	24	15, 20	8	20, 18	E
1, 64	54	6, 30	36	10, 32	23	15, 22	7	20, 20	F
1, 72	54	6, 32	35	11, 24	22	15, 24	6	22, 16	H
1½, 56	53	6, 36	34	11, 28	20	16, 16	10	22, 18	J
2, 48	50	6, 40	33	11, 30	19	16, 18	7	24, 14	L
2, 56	49	7, 28	33	12, 20	22	16, 20	5	24, 16	M
2, 64	48	7, 30	32	12, 22	20	17, 16	8	24, 18	N
3, 40	47	7, 32	31	12, 24	19	17, 18	4	26, 14	O
3, 48	45	8, 24	31	12, 28	18	17, 20	3	26, 16	P
3, 56	44	8, 30	30	13, 20	17	18, 16	2	28, 14	R
4, 32	45	8, 32	29	13, 22	17	18, 18	1	28, 16	S
4, 36	44	9, 24	30	13, 24	15	18, 20	A	30, 14	U
4, 40	43	9, 28	28	14, 20	15	19, 16	A	30, 16	V
5, 30	41	9, 30	28	14, 22	11	19, 18	B		
5, 32	40	9, 32	26	14, 24	10	19, 20	C		

In most cases it is advisable to use drills one or even two sizes larger than above list.

D 2945.

BELT RIVETS AND BURS.

Tables showing number of Rivets and Burs to the pound.

No.	1-4	5-16	3-8	7-16	1-2	9-16	5-8	3-4	7-8	1	1 1-8	1 1-4	1 1-2	Burs.
7	272	250	228	180	164	160	148	112	116	100	84	80	69	345
8	276	248	208	200	178	172	152	136	110	104	96	.....	.....	390
9	340	280	272	248	228	220	184	176	156	136	.....	.....	.....	610
10	544	448	384	340	304	300	272	238	204	.....	.....	.....	.....	716
12	588	512	452	404	364	334	304	272	.....	.....	.....	.....	.....	985
13	996	852	532	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1630

D 2946.

SIZES OF STUBS' STEEL WIRE GAUGE

In thousandths of inches.—Letter Sizes.

Z	Y.	X.	W.	V.	U.	T.	S.	R.	Q.	P.	O.	N.
.413	.404	.397	.386	.377	.368	.358	.348	.339	.332	.323	.316	.302
M.	L.	K.	J.	I.	H.	G.	F.	E.	D.	C.	B.	A.
.295	.290	.281	.277	.272	.266	.261	.257	.250	.246	.242	.238	.234

SIZES OF TWIST DRILL OR STUBS' STEEL WIRE.—GAUGE.

D 2947.

IN DECIMALS.

No.	Inch.	No.	Inch.	No.	Inch.	No.	Inch.	No.	Inch.	No.	Inch.	No.	Inch.
1	.2280	10	.1935	19	.1660	28	.1405	37	.1040	46	.0810	55	.0520
2	.2210	11	.1910	20	.1610	29	.1360	38	.1015	47	.0785	56	.0465
3	.2130	12	.1890	21	.1590	30	.1285	39	.0995	48	.0760	57	.0430
4	.2090	13	.1850	22	.1570	31	.1200	40	.0980	49	.0730	58	.0420
5	.2055	14	.1820	23	.1540	32	.1160	41	.0960	50	.0700	59	.0410
6	.2040	15	.1800	24	.1520	33	.1130	42	.0935	51	.0670	60	.0400
7	.2010	16	.1770	25	.1495	34	.1110	43	.0890	52	.0635	.....	.....
8	.1990	17	.1730	26	.1470	35	.1100	44	.0860	53	.0595	.....	.....
9	.1960	18	.1695	27	.1440	36	.1065	45	.0820	54	.0550	.....	.....

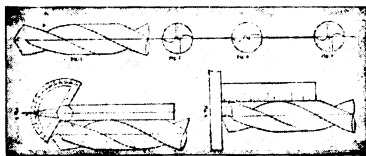
TABLE SHOWING THE DIFFERENCE BETWEEN WIRE GAUGES.

No.	Old English or London.	Stubs' or Birmingham.	Washburn & Moen.	Brown & Sharpe's.	No.	Old English or London.	Stubs' or Birmingham.	Washburn & Moen.	Brown & Sharpe's.
0000	.454	.454	.393	.460	19	.040	.042	.041	.03589
000	.425	.425	.362	.40964	20	.035	.035	.035	.03196
00	.380	.380	.331	.36480	21	.0315	.032	.032	.02846
0	.340	.340	.307	.32495	22	.0295	.028	.028	.025347
1	.300	.300	.283	.28930	23	.027	.025	.025	.022571
2	.284	.284	.263	.25763	24	.025	.022	.023	.0201
3	.259	.259	.244	.22942	25	.023	.020	.020	.0179
4	.238	.238	.225	.20431	26	.0205	.018	.018	.01594
5	.220	.220	.207	.18194	27	.01875	.016	.017	.014195
6	.203	.203	.192	.16202	28	.0165	.014	.016	.012641
7	.180	.180	.177	.14428	29	.0155	.013	.015	.011257
8	.165	.165	.162	.12849	30	.01375	.012	.014	.010025
9	.148	.148	.148	.11443	31	.01225	.010	.0135	.008928
10	.134	.134	.135	.10189	32	.01125	.009	.013	.00795
11	.120	.120	.120	.09074	33	.01025	.008	.011	.00708
12	.109	.109	.105	.08081	34	.0095	.007	.01	.0063
13	.095	.095	.092	.07196	35	.009	.005	.0095	.00561
14	.083	.083	.080	.06408	36	.0075	.004	.009	.005
15	.072	.072	.072	.05706	37	.0065	.....	.0085	.00445
16	.065	.065	.063	.05082	38	.00575	.....	.008	.003965
17	.058	.058	.054	.04525	39	.005	.....	.0075	.003531
18	.049	.049	.047	.04030	40	.0045	.....	.007	.003144

WIRE GAUGES IN INCHES.

Stubs'.				Brown & Sharpe's.			
No.	1.	5-16 inch.		Nos.	0 and 1.	5-16 in.	
"	3.	1-4 "		"	2.	1-4 "	
"	7.	3-16 "		"	5.	3-16 "	
				No.	11.	1-8 inch.	
				"	16.	1-16 "	
				"	21.	1-32 "	
				No.	8.	1-8 inch.	
				"	14.	1-16 "	
				"	20.	1-32 "	

D 2953. A RULE FOR GRINDING TWIST DRILLS.



Few operations on tools in the shop are more frequently disappointing than the grinding or sharpening of the drills. That the cutting edges have a proper and uniform angle with the longitudinal axis of the drill (see Fig. 6), having them of exactly equal length and the lips of the drill well

and sufficiently backed off or cleared, are points generally understood as requisite to the satisfactory performance of a drill, though not always attained. Practical suggestions for the grinding of drills have been published from time to time. We append in part from these, hoping they will be found useful. If the clearance of a drill is insufficient or imperfect it will not cut. When force is applied it resists the power of the drilling machine, and is crushed or split. It is well to start a drill after grinding, by hand, observing the character of the chips, which should characterize a clean cutting tool. In wrought metal the chip will sometimes attain a length of several feet. Prof. Sweet suggests that the rear of the lip of a drill be removed, as shown by cut No. 1; this makes the cutting edge much like a flat drill. Drills properly made have their cutting edges straight when ground to a proper angle, which is 59 degrees, as shown in cut No. 6. Grinding to less angle leaves the lip hooking, and is likely to produce a crooked and irregular hole. The grinding lines to a drill are placed slightly above the center, to allow for the proper angle of point, which is an important factor. This angle is an index to the clearance. If the angle is too much, the drill cuts rank; if not enough, the drill may not cut. Fig. 2 shows a proper angle. In Fig. 3 the angle is too sharp. In Fig. 4 the angle runs backward, and shows the want of clearance. An effective method of determining the clearance, is to set the point of the drill on a plane surface, holding a scale as shown in cut No. 5; by revoking the drill its clearance is shown, as well as the height of the cutting lips, which should be equal; also the cutting edges should be of exactly equal lengths—any inequality of lengths doubles itself in the work. To strengthen the drill, the center is made thicker toward the shank. As the drill is shortened through use, the center should be thinned, care being taken to remove an equal amount of stock on each side, and to keep the point central. In grinding a drill preserve the original form, which usually will insure rapid and satisfactory work.

SPEED OF DRILLS.

The following table shows the revolutions per minute for Drills from 1-16 inch to 2 inch diameter, as usually applied:

Diameter of Drill.	Speed for Steel.	Speed for Iron.	Speed for Brass.	Diameter of Drills.	Speed for Steel.	Speed for Iron.	Speed for Brass.
1-16 inch.	940	1280	1560	1 1-16 inch.	54	75	95
1-8 "	460	660	785	1 1-8 "	52	70	90
3-16 "	310	420	540	1 3-16 "	49	66	85
1-4 "	230	320	400	1 1-4 "	46	62	80
5-16 "	190	260	320	1 5-16 "	44	60	75
3-8 "	150	220	260	1 3-8 "	42	58	72
7-16 "	130	185	230	1 7-16 "	40	56	69
1-2 "	115	160	200	1 1-2 "	39	54	66
9-16 "	100	140	180	1 9-16 "	37	51	63
5-8 "	95	130	160	1 5-8 "	36	49	60
11-16 "	85	115	145	1 11-16 "	34	47	58
3-4 "	75	105	130	1 3-4 "	33	45	56
13-16 "	70	100	120	1 13-16 "	32	43	54
7-8 "	65	90	115	1 7-8 "	31	41	52
15-16 "	62	85	110	1 15-16 "	30	40	51
1 "	58	80	100	2 "	29	39	49

One inch to be drilled in soft cast iron will usually require: For 1-4 inch Drill, 125 revolutions; for 1-2 inch Drill, 120 revolutions; for 3-4 inch Drill, 100 revolutions; for 1 inch Drill, 95 revolutions.

D 2954. Decimal Equivalents of 8ths, 16ths, 32ds and 64ths of an Inch.

For Use in Connection with Brown & Sharpe Mfg. Co.'s Micrometer Caliper.

8ths.	16ths.	32ds.	64ths.
1-8 = .125	1-16 = .0625	1-32 = .03125	1-64 = .015625
1-4 = .250	3-16 = .1875	3-32 = .09375	3-64 = .046875
3-8 = .375	5-16 = .3125	5-32 = .15625	5-64 = .078125
1-2 = .500	7-16 = .4375	7-32 = .21875	7-64 = .109375
5-8 = .625	9-16 = .5625	9-32 = .28125	9-64 = .140625
3-4 = .750	11-16 = .6875	11-32 = .34375	11-64 = .171875
7-8 = .875	13-16 = .8125	13-32 = .40625	13-64 = .203125
	15-16 = .9375	15-32 = .46875	15-64 = .234375
		17-32 = .53125	17-64 = .265625
		19-32 = .59375	19-64 = .296875
			21-64 = .328125
			23-64 = .359375
			25-64 = .390625
			27-64 = .421875
			29-64 = .453125
			31-64 = .484375
			33-64 = .515625
			35-64 = .546875
			37-64 = .578125
			39-64 = .609375
			41-64 = .640625
			43-64 = .671875
			45-64 = .703125
			47-64 = .734375
			49-64 = .765625
			51-64 = .796875
			53-64 = .828125
			55-64 = .859375
			57-64 = .890625
			59-64 = .921875
			61-64 = .953125
			63-64 = .984375

D 2960.

TAP DRILLS.

Table showing the different sizes of Drills that should be used when a full thread is to be tapped in a hole. The sizes given are practically correct.

Diam. of Tap.	No. Threads to Inch.	Drill for V Thread.				Drill for U. S. Standard Thread.	Drill for Whitworth Thread.
1-16	64	No. 56					Badger Die Stock Always Cuts Same Size.
3-32	48	50					
1-8	32	48	39				
5-32	32	40	32	30			
3-16	24	32	30	26			
7-32	24		18				
1-4	16	18	20	5-32	5-32	11-64	3-16
9-32	16	18	20	3-16	13-64	13-64	
5-16	16	18		7-32	15-64		1-4
11-32	16	18		1-4	17-64		15-64
3-8	14	16	18	1-4	9-32	9-32	9-32
13-32	14	16	18	19-64	21-64	21-64	
7-16	14	16		21-64	11-32		11-32
15-32	14	16		23-64	3-8		
1-2	12	13	14	3-8	25-64	25-64	13-32
17-32	12	13	14	13-32	27-64	27-64	3-8
9-16	12	14		7-16	29-64		7-16
19-32	12	14		15-32	31-64		
5-8	10	11	12	15-32		1-2	1-2
21-32	10	11	12	1-2	17-32	17-32	
11-16	11	12		9-16	9-16		
23-32	11	12		19-32	19-32		
3-4	10	11	12	19-32	5-8	5-8	5-8
25-32	10	11	12	5-8	21-32	21-32	
13-16	10			21-32			
27-32	10			11-16			
7-8	9	10		45-64	23-32	23-32	23-32
29-32	9	10		47-64	3-4		
15-16	9			49-64			
31-32	9			51-64			
1	8			13-16		27-32	27-32
1 1-32	8			53-64			
1 1-16	8			55-64			
1 3-32	8			57-64			
1 1-8	7	8		29-32	15-16	15-16	15-16
1 5-32	7	8		15-16	31-32		
1 3-16	7	8		31-32	1		
1 7-32	7	8		1	1 1-32		
1 1-4	7			1 1-32		1 1-16	1 1-16
1 9-32	7			1 1-16			
1 5-16	7			1 3-32			
1 11-32	7			1 1-8			
1 3-8	6			1 1-8	1 5-32	1 5-32	1 5-32
1 13-32	6			1 5-32			
1 7-16	6			1 5-32			
1 15-32	6			1 3-16			
1 1-2	6			1 15-64	1 9-32	1 9-32	1 9-32
1 17-32	6			1 9-32			
1 9-16	6			1 9-32			
1 19-32	6			1 5-16			
1 5-8	5	5 1/2		1 9-32	1 5-16	1 3-8	1 23-64
1 21-32	5	5 1/2		1 5-16	1 11-32		
1 11-16	5	5 1/2		1 11-32	1 3-8		
1 23-32	5	5 1/2		1 3-8	1 13-32		
1 3-4	5			1 13-32		1 1-2	1 1-2
1 25-32	5			1 7-16			
1 13-16	5			1 15-32			
1 27-32	5			1 1-2			
1 7-8	4 1/2	5		1 17-32	1 17-32	1 5-8	1 37-64
1 29-32	4 1/2	5		1 9-16	1 9-16		
1 15-16	4 1/2	5		1 19-32	1 19-32		
1 31-32	4 1/2	5		1 5-8	1 5-8		
2	4 1/2			1 21-32		1 23-32	1 45-64



D 2966. Decimal Equivalents of Screw Gauge for Machine and Wood Screws.

The difference between consecutive sizes is .01316 inches.

No. of Screw G'uge	Size of No. in D'cmls.	No. of Screw G'uge	Size of No. in D'cmls.	No. of Screw G'uge	Size of No. in D'cmls.	No. of Screw G'uge	Size of No. in D'cmls.	No. of Screw G'uge	Size of No. in D'cmls.
000	.03152	9	.17628	20	.32104	31	.46580	42	.61056
00	.04468	10	.18944	21	.33420	32	.47896	43	.62372
0	.05784	11	.20260	22	.34736	33	.49212	44	.63688
1	.07100	12	.21576	23	.36052	34	.50528	45	.65004
2	.08416	13	.22892	24	.37368	35	.51844	46	.66320
3	.09732	14	.24208	25	.38684	36	.53160	47	.67636
4	.11048	15	.25524	26	.40000	37	.54476	48	.68952
5	.12364	16	.26840	27	.41316	38	.55792	49	.70268
6	.13680	17	.28156	28	.42632	39	.57108	50	.71584
7	.14996	18	.29472	29	.43948	40	.58424		
8	.16312	19	.30788	30	.45264	41	.59740		

D 2967. Table of Decimal Equivalents of Stubs' Steel Wire Gauge.

Letter.	Size of Letter in Decimals.	No. of Wire Gauge.	Size of Number in Decimals.	No. of Wire Gauge.	Size of Number in Decimals.	No. of Wire Gauge.	Size of Number in Decimals.
Z.....	.413	1	.227	28	.139	55	.050
Y.....	.404	2	.219	29	.134	56	.045
X.....	.397	3	.212	30	.127	57	.042
W.....	.386	4	.207	31	.120	58	.041
V.....	.377	5	.204	32	.115	59	.040
U.....	.368	6	.201	33	.112	60	.039
T.....	.358	7	.199	34	.110	61	.038
S.....	.348	8	.197	35	.108	62	.037
R.....	.339	9	.194	36	.106	63	.036
Q.....	.332	10	.191	37	.103	64	.035
P.....	.323	11	.188	38	.101	65	.033
O.....	.316	12	.185	39	.099	66	.032
N.....	.302	13	.182	40	.097	67	.031
M.....	.295	14	.180	41	.095	68	.030
L.....	.290	15	.178	42	.092	69	.029
K.....	.281	16	.175	43	.088	70	.027
J.....	.277	17	.172	44	.085	71	.026
I.....	.272	18	.168	45	.081	72	.024
H.....	.266	19	.164	46	.079	73	.023
G.....	.261	20	.161	47	.077	74	.022
F.....	.257	21	.157	48	.075	75	.020
E.....	.250	22	.155	49	.072	76	.018
D.....	.246	23	.153	50	.069	77	.016
C.....	.242	24	.151	51	.066	78	.015
B.....	.238	25	.148	52	.063	79	.014
A.....	.234	26	.146	53	.058	80	.013
		27	.143	54	.055		

STUBS' GAUGES.

In using the gauges known as Stubs' Gauges, there should be constantly borne in mind the difference between the Stubs' Iron Wire Gauge and the Stubs' Steel Wire Gauge.

D 2968. STEEL MUSIC WIRE AND MUSIC SPRING WIRE.

Table of Sizes and Approximate Number of Feet in One Pound of Wire.

Music Wire. Gauge No.	Diam. in Dec. of 1 In.	No. Feet in One Lb.	Music Wire. Gauge No.	Diam. in. Dec. of 1 In.	No. of Feet in One Lb.
10	.024	680	22	.048	165
11	.026	575	23	.051	150
12	.028	485	24	.055	130
13	.030	420	25	.059	110
14	.032	375	26	.063	95
15	.034	330	27	.067	85
16	.036	295	28	.071	75
17	.038	265	29	.074	68
18	.040	235	30	.078	61
19	.042	215	31	.082	55
20	.044	200	32	.086	50
21	.046	180	33	.090	40

This Wire is put up in 1 lb. and 5 to 10 lb. coils.

D 2974. Sizes of Tap Drills for U. S. Standard Threads.

By the formulas given below, the results, strictly speaking, are the diameters of the bottoms of the threads. The tap drill is, in common practice, the one that is one or two gauge numbers larger, for the smaller, or numbered sizes, and one that is about .005 inch larger for the larger sizes. The amount allowed for clearance varies in different shops and on different classes of work.

Size of tap drill for U. S. standard thread—outside diameter of screw—
1.299

threads to the inch.

Size of tap drill for 3-4 inch screw, U. S. standard thread, 10 threads to the

1.299

inch = $.750 - \frac{1.299}{10} = .750 - .1299 = .6201$, size of tap drill.

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Diam. of Screw.	Threads per In.	Size of Tap Drill.	Diam. of Screw.	Threads per In.	Size of Tap Drill.	Diam. of Screw.	Threads per In.	Size of Tap Drill.	Diam. of Screw.	Threads per In.	Size of Tap Drill.
1-4	20	.185	1	8	.837	2 1-4	4 1-2	1.962	4 1-4	2 7-8	3.798
5-16	18	.240	1 1-8	7	.940	2 1-2	4	2.176	4 1-2	2 3-4	4.028
3-8	16	.294	1 1-4	7	1.065	2 3-4	4	2.426	4 3-4	2 5-8	4.256
7-16	14	.344	1 3-8	6	1.160	3	3 1-2	2.629	5	2 1-2	4.480
1-2	13	.400	1 1-2	6	1.284	3 1-4	3 1-2	2.879	5 1-4	2 1-2	4.730
9-16	12	.454	1 5-8	5½	1.389	3 1-2	3 1-4	3.100	5 1-2	2 3-8	4.953
5-8	11	.507	1 3-4	5	1.491	3 3-4	3	3.317	5 3-4	2 3-8	5.203
3-4	10	.620	1 7-8	5	1.616	4	3	3.567	6	2 1-4	5.423
7-8	9	.731	2	4½	1.712						

D 2975. SIZES OF TAP DRILLS FOR V THREADS. 1.732

Size of tap drill for V thread—outside diameter of screw—

threads to in.

Size of tap drill for ¾ inch V thread, 10 threads to the inch = $.750 -$
1.732

— $.750 - .1732 = .5768$, size of tap drill.

10

**Table Showing Depth of Space and Thickness of Tooth in Spur Wheels
D 2976. when Cut with Our Cutters.**

Pitch of Cutter.	Depth to be Cut in Gear. In.	Thickness of Tooth at Pitch Line. Inches.	Pitch of Cutter.	Depth to be Cut in Gear. In.	Thickness of Tooth at Pitch Line. Inches.
2	1.078	.785	12	.180	.131
2 1-4	.958	.697	14	.154	.112
2 1-2	.863	.628	16	.135	.098
2 3-4	.784	.570	18	.120	.087
3	.719	.523	20	.108	.079
3 1-2	.616	.448	22	.098	.071
4	.539	.393	24	.090	.065
5	.431	.314	26	.083	.060
6	.359	.262	28	.077	.056
7	.308	.224	30	.072	.052
8	.270	.196	32	.067	.049
9	.240	.175	36	.060	.044
10	.216	.157	40	.054	.039
11	.196	.143	48	.045	.033

D 2977. Tables for Use with Draughtsmen's Protractors.

TABLE FOR DIVIDING CIRCLES OR LAYING OUT GEOMETRICAL FIGURES.				Tapers per Foot and Corresponding Angles.		
No. of Sides.	Included Angle.	Angles at Cen- ter of Circles.	Angles for Sides of Fig's	Taper per ft.	Included Angle.	Angle with CenterLine
3	120°	30°	30°	1-8"	0°-36'	0°-18'
4	90°	45°	45°	1-4"	1°-12'	0°-36'
5	72°	18°-54°	36°-72°	5-16"	1°-30'	0°-45'
6	60°	30°	30°	3-8"	1°-47'	0°-53'
8	45°	45°	22° 30'	7-16"	2°-05'	1°-02'
10	36°	54°-18°	18°-54°	1-2"	2°-23'	1°-11'
12	30°	60°	15°-45°	3-4"	3°-35'	1°-47'
14	25° 43'	64° 17'-38° 34'	12° 51'-38° 34'	15-16	4°-28'	2°-14'
		12° 51'	64° 17'	1"	4°-45'	2°-23'
16	22° 30'	67° 30'-45°	11° 15'-33° 45'	1 1-2"	7°-08'	3°-34'
18	20°	70°-50°-30°	10°-30°-50°	1 3-4"	8°-20'	4°-10'
		10°	70°	2"	9°-32'	4°-46'
20	18°	72°-54°	9°-27°-45°	2 1-2"	11°-54'	5°-57'
24	15°	75°-60°-45°	7° 30'-22° 30'	3"	14°-16'	7°-08'
			37° 30'	3 1-2"	16°-36'	8°-18'
				4"	18°-54'	9°-27'

Angle of head for wood screws, 76°; 38° on a side. Angle of worm thread, 29°; 14½° on a side.

WEIGHT PER FOOT OF BRASS TUBES, OUTSIDE MEASUREMENT
D 2983. STUBS' GAUGE.

Nos. Thousandths of an Inch.	1 .300	2 .284	3 .259	4 .238	5 .220	6 .203	7 .180	8 .165	9 .148	10 .134	11 .120	12 .109
Diameter.												
$\frac{1}{4}$ inch.												
$\frac{3}{8}$ "											.5	.33
$\frac{1}{2}$ "								.64	.60	.57	.53	.49
$\frac{5}{8}$ "						.99	.92	.88	.81	.76	.70	.65
$\frac{3}{4}$ "						1.28	1.18	1.11	1.03	.95	.87	.81
$\frac{7}{8}$ "			1.84	1.75	1.67	1.57	1.45	1.35	1.25	1.15	1.05	.97
1 "	2.42	2.34	2.21	2.09	1.98	1.87	1.70	1.59	1.46	1.34	1.22	1.12
$1\frac{1}{8}$ "	2.84	2.75	2.59	2.43	2.30	2.16	1.96	1.83	1.67	1.53	1.39	1.28
$1\frac{1}{4}$ "	3.28	3.15	2.96	2.77	2.61	2.45	2.22	2.07	1.89	1.73	1.57	1.44
$1\frac{1}{2}$ "	3.70	3.56	3.34	3.11	2.93	2.74	2.49	2.31	2.10	1.92	1.74	1.59
$1\frac{3}{4}$ "	4.10	4.00	3.70	3.46	3.25	3.02	2.76	2.55	2.32	2.12	1.92	1.75
$1\frac{7}{8}$ "	4.57	4.37	4.08	3.80	3.56	3.33	3.00	2.79	2.52	2.31	2.09	1.91
$1\frac{9}{8}$ "	5.01	4.79	4.46	4.15	3.88	3.62	3.27	3.03	2.74	2.50	2.26	2.07
$1\frac{11}{8}$ "	5.44	5.20	4.83	4.49	4.20	3.92	3.51	3.27	2.95	2.70	2.44	2.22
2 "	5.86	5.55	5.21	4.84	4.52	4.21	3.77	3.51	3.17	2.89	2.61	2.39
$2\frac{1}{4}$ "	6.73	6.43	5.95	5.53	5.15	4.79	4.32	3.99	3.60	3.28	2.93	2.70
$2\frac{1}{2}$ "	7.60	7.24	6.70	6.21	5.78	5.37	4.82	4.47	4.03	3.67	3.31	3.02
$2\frac{3}{4}$ "	8.46	8.06	7.44	6.89	6.40	5.96	5.35	4.94	4.45	4.06	3.65	3.33
3 "	9.35	8.90	8.19	7.58	7.05	6.53	5.87	5.42	4.88	4.44	4.00	3.65
$3\frac{1}{4}$ "	10.18	9.69	8.94	8.26	7.60	7.13	6.39	5.90	5.31	4.83	4.35	3.96
$3\frac{1}{2}$ "	11.00	10.50	9.68	8.95	8.32	7.71	6.90	6.37	5.73	5.22	4.69	4.28
$3\frac{3}{4}$ "	12.00	11.50	10.48	9.64	8.94	8.30	7.43	6.85	6.17	5.61	5.04	4.59
4 "	12.80	12.15	11.17	10.32	9.59	8.75	7.95	7.33	6.60	6.00	5.38	4.90
$4\frac{1}{4}$ "	13.63	12.98	11.92	11.00	10.22	9.46	8.47	7.80	7.02	6.38	5.73	5.22
$4\frac{1}{2}$ "	14.50	13.79	12.67	11.71	10.88	10.04	8.99	8.29	7.45	6.77	6.08	5.53
$4\frac{3}{4}$ "	15.40	14.60	13.42	12.39	11.49	10.64	9.50	8.77	7.88	7.16	6.43	5.85
5 "	16.30	15.45	14.18	13.07	12.12	11.23	10.01	9.24	8.31	7.55	6.78	6.17
$5\frac{1}{4}$ "	17.10	16.30	14.92	13.76	12.79	11.81	10.54	9.72	8.73	7.93	7.13	6.49
$5\frac{1}{2}$ "	18.00	17.09	15.67	14.44	13.39	12.39	11.08	10.19	9.17	8.32	7.47	6.80
$5\frac{3}{4}$ "	18.90	17.90	16.42	15.15	14.02	12.98	11.59	10.68	9.58	8.71	7.81	7.12
6 "	19.70	18.70	17.14	15.80	14.66	13.56	12.11	11.16	10.02	9.09	8.16	7.45

Nos. Thousandths of an Inch.	13 .095	14 .083	15 .072	16 .065	17 .058	18 .049	19 .042	20 .035	21 .032	22 .028	23 .025	24 .022
Diameter.												
$\frac{1}{4}$ inch.	.17	.16	.15	.14	.13	.11	.10	.09	.08	.07	.07	.06
$\frac{3}{8}$ "	.31	.28	.25	.23	.21	.19	.16	.14	.13	.11	.10	.09
$\frac{1}{2}$ "	.44	.40	.36	.33	.30	.26	.22	.19	.17	.15	.14	.12
$\frac{5}{8}$ "	.58	.52	.46	.42	.38	.33	.28	.24	.22	.19	.17	.15
$\frac{3}{4}$ "	.72	.64	.56	.52	.46	.40	.34	.29	.27	.23	.21	.18
$\frac{7}{8}$ "	.86	.76	.67	.61	.55	.47	.40	.34	.31	.27	.25	.22
1 "	1.00	.88	.77	.70	.63	.54	.47	.39	.36	.31	.28	.25
$1\frac{1}{8}$ "	1.13	1.00	.87	.80	.72	.61	.53	.44	.41	.35	.32	.28
$1\frac{1}{4}$ "	1.27	1.12	.98	.89	.80	.68	.59	.49	.45	.40	.35	.31
$1\frac{1}{2}$ "	1.40	1.24	1.08	.98	.88	.75	.65	.54	.50	.45	.39	.34
$1\frac{3}{4}$ "	1.54	1.36	1.19	1.08	.97	.82	.71	.59	.54	.48	.43	.38
$1\frac{7}{8}$ "	1.68	1.48	1.29	1.17	1.05	.89	.77	.64	.59	.52	.46	.41
$1\frac{9}{8}$ "	1.82	1.61	1.40	1.27	1.14	.97	.83	.70	.64	.56	.50	.44
$1\frac{11}{8}$ "	1.95	1.72	1.50	1.37	1.22	1.03	.89	.74	.68	.60	.54	.47
2 "	2.10	1.84	1.61	1.45	1.30	1.10	.95	.80	.73	.64	.57	.50
$2\frac{1}{4}$ "	2.37	2.08	1.81	1.64	1.47	1.25	1.07	.90	.82	.72	.64	.56
$2\frac{1}{2}$ "	2.64	2.32	2.07	1.83	1.64	1.39	1.19	1.00	.91	.80	.72	.63
$2\frac{3}{4}$ "	2.92	2.56	2.23	2.02	1.81	1.53	1.31	1.10	1.01	.88	.79	.69
3 "	3.20	2.80	2.44	2.20	1.97	1.67	1.44	1.20	1.10	.96	.86	.76
$3\frac{1}{4}$ "	3.47	3.04	2.65	2.40	2.14	1.81	1.56	1.30	1.19	1.04	.93	.82
$3\frac{1}{2}$ "	3.74	3.28	2.85	2.58	2.31	1.96	1.68	1.40	1.28	1.12	1.00	.89
$3\frac{3}{4}$ "	4.02	3.52	3.06	2.77	2.48	2.10	1.80	1.50	1.38	1.21	1.08	.95
4 "	4.29	3.76	3.27	2.96	2.65	2.24	1.92	1.60	1.47	1.28	1.15	1.01
$4\frac{1}{4}$ "	4.57	4.01	3.48	3.15	2.81	2.38	2.04	1.70	1.56	1.37	1.22	1.08
$4\frac{1}{2}$ "	4.84	4.24	3.69	3.34	2.98	2.52	2.17	1.81	1.65	1.45	1.29	1.14
$4\frac{3}{4}$ "	5.12	4.48	3.90	3.53	3.15	2.66	2.29	1.91	1.75	1.53	1.37	1.20
5 "	5.39	4.73	4.10	3.71	3.21	2.81	2.41	2.01	1.84	1.61	1.44	1.26
$5\frac{1}{4}$ "	5.66	4.96	4.31	3.90	3.49	2.95	2.53	2.11	1.93	1.69	1.51	1.33
$5\frac{1}{2}$ "	5.94	5.20	4.52	4.10	3.65	3.09	2.65	2.21	2.02	1.77	1.58	1.39
$5\frac{3}{4}$ "	6.22	5.43	4.73	4.27	3.82	3.23	2.78	2.31	2.12	1.85	1.65	1.46
6 "	6.49	5.68	4.94	4.46	3.99	3.38	2.89	2.41	2.21	1.93	1.73	1.52

$\frac{1}{4}$ inch to 6 inch outside diameter, No. 1 to No. 24 Stubs' Gauge. To find weight of Copper Tubing add 5 per cent. to weight of Brass Tubing.

D 2989. WEIGHT PER FOOT IRON PIPE SIZES.

Seamless Drawn Brass and Copper Tubing to correspond to the outside measurement of iron pipe, and to fit iron fittings.

























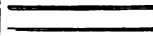




SIZES AND WEIGHTS PER FOOT.

Same as Iron Size.	Outside Diameter.	Inside Diameter.	WEIGHT PER FOOT.	
			Brass.	Copper.
1-8 inch.	13-32 inch.	1-4 inch.	.27 lbs.	.29 lbs.
1-4 "	17-32 "	11-32 "	.43 "	.45 "
3-8 "	21-32 "	15-32 "	.59 "	.62 "
1-2 "	13-16 "	5-8 "	.83 "	.87 "
3-4 "	1 1-16 "	27-32 "	1.15 "	1.19 "
1 "	1 5-16 "	1 3-32 "	1.60 "	1.65 "
1 1-4 "	1 5-8 "	1 11-32 "	2.50 "	2.60 "
1 1-2 "	1 7-8 "	1 19-32 "	3.00 "	3.15 "
2 "	2 3-8 "	2 1-16 "	4.12 "	4.30 "
2 1-2 "	2 7-8 "	2 7-16 "	5.84 "	6.20 "
3 "	3 1-2 "	3 1-16 "	8.16 "	8.75 "
3 1-2 "	4 "	3 1-2 "	10.20 "	11.00 "
4 "	4 1-2 "	4 1-32 "	12.00 "	12.90 "
5 "	5 17-32 "	5 1-32 "	15.90 "	17.25 "
6 "	6 5-8 "	6 1-16 "	20.50 "	22.30 "
7 "	7 5-8 "	7 1-16 "	26.00 "	27.50 "
8 "	8 5-8 "	8 "	29.50 "	33.50 "

Up to 4 inches diameter, 12 foot lengths in stock. Larger sizes made to order.

D 2990.**TABLE**

Showing the full sizes, diameters in decimals of an inch, and the number of feet in one pound of each Gauge Brass Wire as drawn by us.

No.	Full Size of the Wire. Stubs' Gauge.	Deci- mals of an Inch.	Feet in a Pound.	No.	Full Size of the Wire. Stubs' Gauge.	Deci- mals of an Inch.	Feet in a Pound.
000		.425	2.873	8		.165	24.365
00		.380	3.444	9		.148	17.238
0		.340	3.619	10		.134	20.698
1		.300	4.698	11		.120	26.174
2		.284	5.444	12		.109	34.254
3		.259	6.333	13		.095	44.655
4		.238	7.460	14		.083	59.174
5		.220	8.809	15		.072	72.984
6		.203	10.270	16		.065	95.396
7		.180	12.047	17		.058	129.873
				18		.049	172.401
				19		.042	232.222
				20		.035	301.249
				21		.032	370.036
				22		.028	476.190
				23		.025	640.74
				24		.022	879.03
				25		.020	1189.71
				26		.018	1485.02
				27		.016	1872.71
				28		.014	2361.42
				29		.013	2978.91
				30		.012	3754.83

D 2996. Whts Sheet Copper per Sq. Ft. and Thickness per Eng. Wire Gauge.

Eng. Wire Ga.	Wt. per Sq. Ft.		14 x 48	24 x 48	30 x 60	36 x 72	48 x 72
No.	Lbs.	oz.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	14	8	.....	116	181	261	348
2	13	14	.....	111	174	250	334
3	12	12	.....	102	159	230	306
4	11	9	.....	93	145	209	278
5	10	1	.....	81	126	182	242
6	9	6	.....	75	118	169	226
7	8	11	.....	70	109	157	209
8	7	14	.....	63	99	142	190
9	7	3	.....	58	90	130	173
10	6	8	.....	48	81	117	156
11	5	12	.....	46	73	104	139
12	5	1	.....	41	64	91	122
13	4	5	.....	35	54	78	104
14	3	9	.....	29	45	65	86
15	3	4	.....	26	41	59	78
16	2	14	.....	23	36	52	70
17	2	8	.....	20	32	45	60
18	2	2	.....	18	27	39	52
19	1	15	.....	16	24	35	47
20	1	12	.....	14	22	32	43
21	1	9	.....	13	20	29	39
22	1	7	6 1/2	12	18	26	35
23	1	4	5 7/8	10	16	23	31
24	1	2	5 1/4	9	15	21	28
25	1	0	4 5/8	8	12 1/2	19	25
26		14	4	7	11	15	21
27		12	3 1/2	6	9 3/8	13	18
28		10	3	5	7	11	15

WEIGHT OF BRASS, COPPER AND ZINC

D 2997. TUBING, PER FOOT.

Numbered by Brown & Sharpe's Gauge. Weight in Thousandths of Pounds.

BRASS No. 17.		BRASS. No. 20.		COPPER. Lightning Rod Tube. No. 23.	
Inch.	Lbs.	Inch.	Lbs.	Inch.	Lbs.
1-4	.107	1-8	.032	1-2	.162
5-16	.157	3-16	.039	9-16	.176
3-8	.185	1-4	.063	5-8	.186
7-16	.234	5-16	.106	11-16	.211
1-2	.266	3-8	.126	3-4	.229
9-16	.318	7-16	.158	ZINC. No. 20.	
5-8	.333	1-2	.189	1-2	.161
3-4	.377	9-16	.208	5-8	.185
7-8	.462	5-8	.220	3-4	.234
1	.542	3-4	.252	7-8	.272
1 1-8	.675	7-8	.284	1	.311
1 1-4	.740	1	.378	1 1-4	.380
1 1-2	.915	1 1-4	.500	1 1-2	.452
1 3-4	.980	1 1-2	.580		
2	1.000				
2 1-2	1.506				
3	2.188				

D 2998.

**WEIGHT OF
ROUND BOLT
COPPER,
PER FOOT.**

Diam. Inch.	Wt. per Foot in Length.
3-8.....	.424 lbs.
1-2.....	.755 "
5-8.....	1.17 "
3-4.....	1.69 "
7-8.....	2.31 "
1.....	3.02 "
1 1-8.....	3.82 "
1 1-4.....	4.71 "
1 3-8.....	5.71 "
1 1-2.....	6.79 "
1 5-8.....	7.94 "
1 3-4.....	9.21 "
1 7-8.....	10.61 "
2.....	12.08 "

D 2999. SHEET AND BAR BRASS.—Weight in Pounds.

Thickness, or Diam., or Side; Inch.	Sheets per Sq. Foot.	Square Bars, 1 ft. long.	Round Bars, 1 ft. long.	Thickness, or Diam., or Side; Inch.	Sheets, per Sq. Foot.	Square Bars, 1 ft. long.	Round Bars, 1 foot long.
1-16	2.7	.015	.011	1 1-16	45.95	4.08	3.20
1-8	5.41	.055	.045	1 1-8	48.69	4.55	3.57
3-16	8.12	.125	.1	1 3-16	51.4	5.08	3.97
1-4	10.76	.225	.175	1 1-4	54.18	5.65	4.41
5-16	13.48	.350	.275	1 5-16	56.85	6.22	4.86
3-8	16.25	.51	.395	1 3-8	59.55	6.81	5.35
7-16	19.	.69	.54	1 7-16	62.25	7.45	5.85
1-2	21.65	.905	.71	1 1-2	65.	8.13	6.37
9-16	24.3	1.15	.9	1 9-16	67.75	8.83	6.92
5-8	27.12	1.4	1.1	1 5-8	70.35	9.55	7.48
11-16	29.77	1.72	1.35	1 11-16	73.	10.27	8.05
3-4	32.46	2.05	1.66	1 3-4	75.86	11.	8.65
13-16	35.18	2.4	1.85	1 13-16	78.55	11.82	9.29
7-8	37.85	2.75	2.15	1 7-8	81.25	12.68	9.95
15-16	40.55	3.15	2.48	1 15-16	84.	13.5	10.58
1	43.29	3.65	2.85	2	86.75	14.35	11.25

WEIGHT OF COPPER AND BRASS WIRE AND PLATES.**D 3005. DIAMETERS AND THICKNESS DETERMINED BY AMERICAN GAUGE.**

No. of Gauge.	Size of Each No.	WEIGHT OF WIRE. Per 1,000 Lineal Feet.				WEIGHT OF PLATES. Per Square Foot.			
		Wrought Iron.	Steel.	Copper.	Brass.	Wrought Iron.	Steel.	Copper.	Brass.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
0000	.46000	560.74	566.08	640.51	605.18	17.25	17.48	20.838	19.688
000	.40964	444.68	448.88	507.95	479.91	15.3615	15.5663	18.557	17.533
00	.36480	352.66	355.99	402.83	380.67	13.68	13.8624	16.525	15.613
0	.32486	279.67	282.30	319.45	301.82	12.1823	12.3447	14.716	13.904
1	.28930	221.79	223.89	253.34	239.35	10.8488	10.9984	13.105	12.382
2	.26763	175.89	177.55	200.91	189.82	9.6611	9.7899	11.671	11.027
3	.22942	139.48	140.80	159.32	150.52	8.6033	8.7180	10.398	9.8192
4	.20431	110.62	111.66	126.35	119.38	7.6616	7.7638	9.2552	8.7445
5	.18194	87.720	88.548	100.20	94.666	6.8228	6.9137	8.2419	7.787
6	.16202	69.565	70.221	79.462	75.075	6.0758	6.1568	7.3395	6.9345
7	.14428	55.165	55.685	63.013	59.545	5.4105	5.4826	6.5359	6.1752
8	.12849	43.751	44.164	49.976	47.219	4.8184	4.8826	5.8206	5.4994
9	.11443	34.699	35.026	39.636	37.437	4.2911	4.3483	5.1837	4.8976
10	.10189	27.512	27.772	31.426	29.687	3.8209	3.8718	4.6156	4.3609
11	.090742	21.820	22.026	24.924	23.549	3.4028	3.4482	4.1106	3.8838
12	.080808	17.304	17.468	19.766	18.676	3.0303	3.0707	3.6606	3.4586
13	.071961	13.722	13.851	15.674	14.809	2.6985	2.7345	3.2598	3.0799
14	.064084	10.886	10.989	12.435	11.716	2.4032	2.4352	2.9030	2.7428
15	.057068	8.631	8.712	9.859	9.315	2.1401	2.1686	2.5852	2.4425
16	.050820	6.845	6.909	7.819	7.587	1.9058	1.9312	2.3021	2.1751
17	.045257	5.427	5.478	6.199	5.857	1.6971	1.7198	2.0501	1.937
18	.040303	4.304	4.344	4.916	4.645	1.5114	1.5315	1.8257	1.725
19	.035890	3.413	3.445	3.899	3.684	1.3459	1.3638	1.6258	1.5361
20	.031961	2.708	2.734	3.094	2.920	1.1985	1.2145	1.4478	1.3679
21	.028462	2.147	2.167	2.452	2.317	1.0673	1.0816	1.2893	1.2182
22	.025347	1.703	1.719	1.945	1.838	.95051	.96319	1.1482	1.0849
23	.022571	1.350	1.363	1.542	1.457	.84641	.8577	1.0225	.96604
24	.020100	1.071	1.081	1.223	1.155	.75375	.7638	.91063	.86028
25	.017900	0.8491	0.8571	.9699	0.9163	.67125	.6802	.81087	.76612
26	.015940	0.6734	0.6797	.7692	0.7267	.59775	.60572	.72208	.68223
27	.014185	0.5340	0.5391	.6099	0.5763	.53231	.53941	.64303	.60755
28	.012641	0.4235	0.4275	.4837	0.4570	.47404	.48036	.57264	.54103
29	.011257	0.3358	0.3389	.3835	0.3624	.42214	.42777	.50994	.48180
30	.010025	0.2663	0.2688	.3042	0.2874	.37594	.38095	.45413	.42907
31	.008928	0.2118	0.2132	.2413	0.2280	.3348	.33926	.40444	.38212
32	.007950	0.1675	0.1691	.1913	.1808	.29813	.3021	.36014	.34026
33	.007080	0.1328	0.1341	.1517	.1434	.2655	.26904	.32072	.30302
34	.006304	0.1053	0.1063	.1204	.1137	.2364	.23955	.28557	.26981
35	.005614	.08366	.08445	.0956	0.9015	.21053	.21333	.25431	.24028
36	.005000	.06625	.06687	.0757	.0715	.1875	.19	.2265	.2140
37	.004453	.05255	.05304	.06003	.05671	.16699	.16921	.20172	.19059
38	.003965	.04166	.04305	.04758	.04496	.14869	.15067	.17961	.1697
39	.003531	.03305	.03236	.03755	.03566	.13241	.13418	.15995	.15113
40	.003144	.02620	.02644	.02992	.02827	.1179	.11947	.14242	.13456
Specific Gravity...		7.7747	7.847	8.880	8.386	7.200	7.296	8.698	8.218
Weight, per Cubic Foot		185.874	90.45	554.988	524.16	450.	456.	543.6	513.6

**Table of Decimal Equivalents of Millimeters and Fractions of Millimeters.
For Use in Connection with Brown & Sharpe Mfg. Co.'s Metric
D 3006.**

1-100 mm. = .0003937 inches.

mm.	Inches.	mm.	Inches.	mm.	Inches.	mm.	Inches.	mm.	Inches.
1-50	= .00079	16-50	= .01250	31-50	= .02441	46-50	= .03622	12	= .47244
2-50	= .00157	17-50	= .01339	32-50	= .02520	47-50	= .03701	13	= .51181
3-50	= .00236	18-50	= .01417	33-50	= .02598	48-50	= .03780	14	= .55118
4-50	= .00315	19-50	= .01496	34-50	= .02677	49-50	= .03858	15	= .59055
5-50	= .00394	20-50	= .01575	35-50	= .02756	1	= .03937	16	= .62992
6-50	= .00472	21-50	= .01654	36-50	= .02835	2	= .07874	17	= .66929
7-50	= .00551	22-50	= .01732	37-50	= .02913	3	= .11811	18	= .70866
8-50	= .00630	23-50	= .01811	38-50	= .02992	4	= .15748	19	= .74803
9-50	= .00709	24-50	= .01890	39-50	= .03071	5	= .19685	20	= .78740
10-50	= .00787	25-50	= .01969	40-50	= .03150	6	= .23622	21	= .82677
11-50	= .00866	26-50	= .02047	41-50	= .03228	7	= .27559	22	= .86614
12-50	= .00945	27-50	= .02126	42-50	= .03307	8	= .31496	23	= .90551
13-50	= .01024	28-50	= .02205	43-50	= .03386	9	= .35433	24	= .94488
14-50	= .01102	29-50	= .02283	44-50	= .03465	10	= .39370	25	= .98425
15-50	= .01181	30-50	= .02362	45-50	= .03543	11	= .43307	26	= 1.02362

10 mm. = 1 Centimeter = 0.3937 inches.

10 cm. = 1 Decimeter = 3.937 "

10 dm. = 1 Meter = 39.37 inches.

25.4 mm. = 1 English Inch.

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Blocks.....	230	" or Brass.....	12	" Fifteen Degree Angle,	71
" Geared Differential		" Drill and Needle.....	12	" Double End.....	71
Blocks.....	230	" Flue Brushes.....	221	" Fifteen Degree Angle,	71
Wheel Brushes, Bristle and		" Gauges, Angular.....	124	" Single End.....	71
Tampico.....	268	" " Brown & Sharpe's	125	" Green River, Adjusta-	42
" Brushes, Bristle.....	269	" " and Calliper.....	126	" ble Tap.....	86
" Cutters, Sprocket.....	99	" " Jewelers'.....	124	" Lowell Bridge.....	86
" ".....	155	" German Silver.....	11	" " Ratchet.....	86
" Grinder Four (Shop		" Gun Screw.....	12	" Reamer and Lightning	69
Mark A.).....	243	" List.....	12	" Adjustable Tap.....	42
Wheels, Arkansas.....	234	" Machinery.....	12	" Reversible.....	69
" Buff, Patent Radial		" Market.....	12	" "S" and Diagonal Bax-	70
Thread.....	260	" Needle Drill.....	12	" ter's Adjustable.....	70
" Canvas Glued.....	259	" Phosphor - Bronze In	10	" Star.....	69
" " Union.....	259	" Coils.....	12	" Steel Dog.....	87
" Emery.....	236	" Piano Steel.....	12	" " Socket Bridge.....	86
" Milling or Nurls.....	200	" and Rod Connections.....	265	" Stillson.....	72
" Nurls or Milling.....	200	" Scratch Brushes, Hand.....	266	" Tap.....	42
" Polishing Felt.....	258	" Solder.....	21	" Trim Pipe.....	72
" " List Wood.....	255	" Spooling.....	9	" Wright.....	72
" " Solid Leather.....	256	" Steel and Spring Music.....	262	Wrenches, Pocket, Billings	69
" Sheep Skin.....	257	" Straightening and Cut-	12	" & Spencer.....	72
" Straw Paper, The Excel-		" tting.....	12	Wright Wrenches.....	72
sior.....	257	" Tinned.....	12	Wrought Iron Melting	216
White Metal Numbering		" Weaving.....	12	Ladies.....	
Plates.....	211	Wood Drills Bit Stock.....	29		
" Nickel Composition		" Fillet.....	214		
Special.....	262	" Mallets.....	73		
Whitworth Screw Pitch		" Wood Tanks.....	265		
Gauge.....	165	Woodbridge Lathe and	189		
" Standard.....	220	Planer Tool.....	226		
Wickling.....	220	Woodward's Lathe Center	226		
" Asbestos.....	220	Grinder.....	261		
" Candle.....	220	Woolen, Cotton Flannel and	261		
Wing Callipers, Plain.....	170	Muslin Cloth Buffs.....	132		
" Compass.....	177	Work Basket Rule, Ladies'.....	6		
" Divider.....	177	" and Mouldings, Brass	151		
" and Register Callipers.....	171	Drawn.....	126		
Wire Annealed.....	12	Worm Hobs.....	69		
" Bessemer Steel Spring.....	11	" Thread Tool Gauge.....	70		
" Brass, In Coils.....	9	" Wrench, Agricultural.....	70		
" Brushes, Satin Finish.....	269	" Alligator.....	70		
" Cast Steel.....	12	" "Always Ready".....	70		
" Cloth, Brass and Copper	19				



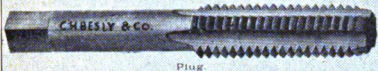
HELMET OIL

A SOLID OIL.




T.M. BESLY & CO.

Taper



C.H. BESLY & CO.

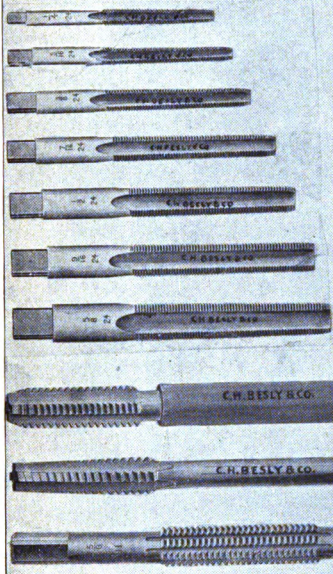
Plug




C.H. BESLY & CO.


Bottoming

WE MAKE TAPS






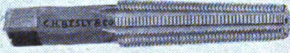
C.H. BESLY & CO.




C.H. BESLY & CO.




C.H. BESLY & CO.




C.H. BESLY & CO.



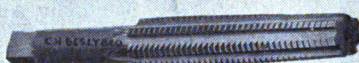
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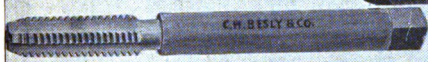
C.H. BESLY & CO.




C.H. BESLY & CO.



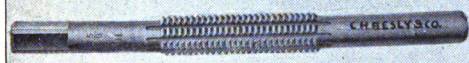
C.H. BESLY & CO.



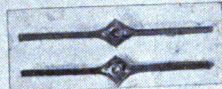
C.H. BESLY & CO.





C.H. BESLY & CO.

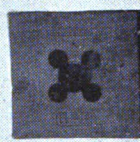


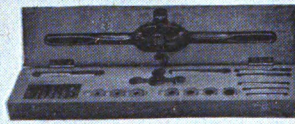
C.H. BESLY & CO.



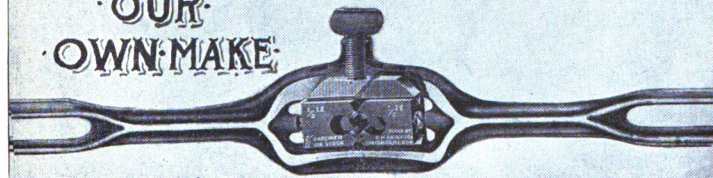








OUR OWN MAKE

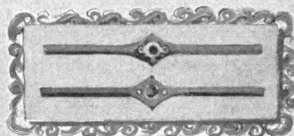
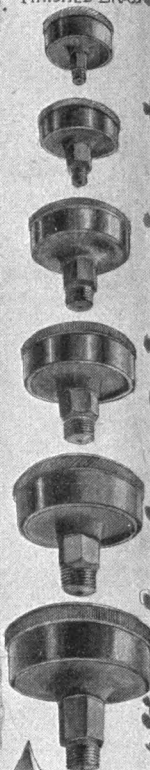


PERFECTION
Oil Cup
ROUGH BRASS.

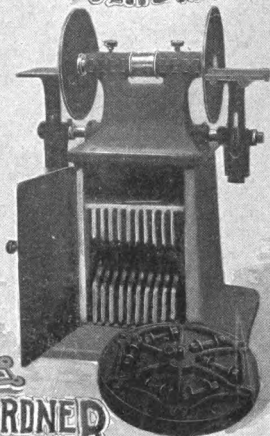
HELMET OIL

(CHARLES H. BESLY & Co.)
10 # 12 N. CANAL ST CHICAGO ILL. U.S.A.

PERFECTION
Oil Cup
FINISHED BRASS.



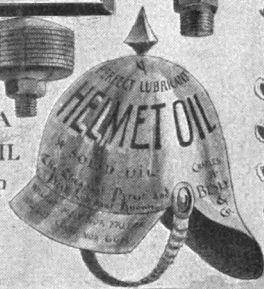
BADGER DIE STOCK



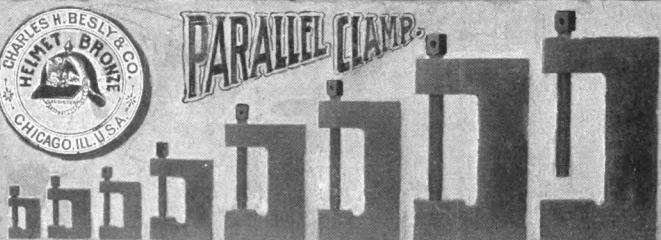
GARDNER GRINDER FOR FLAT SURFACES.

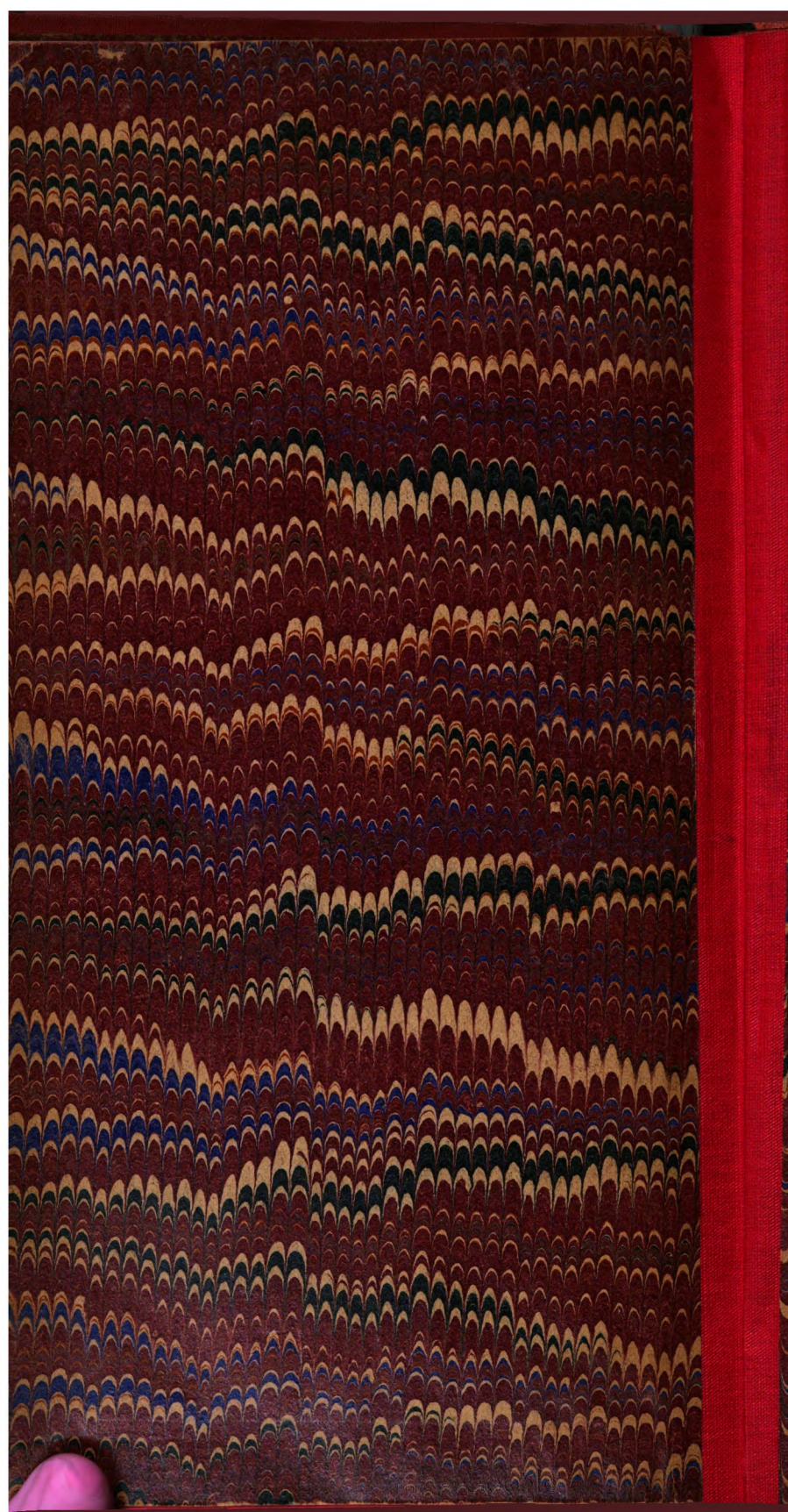


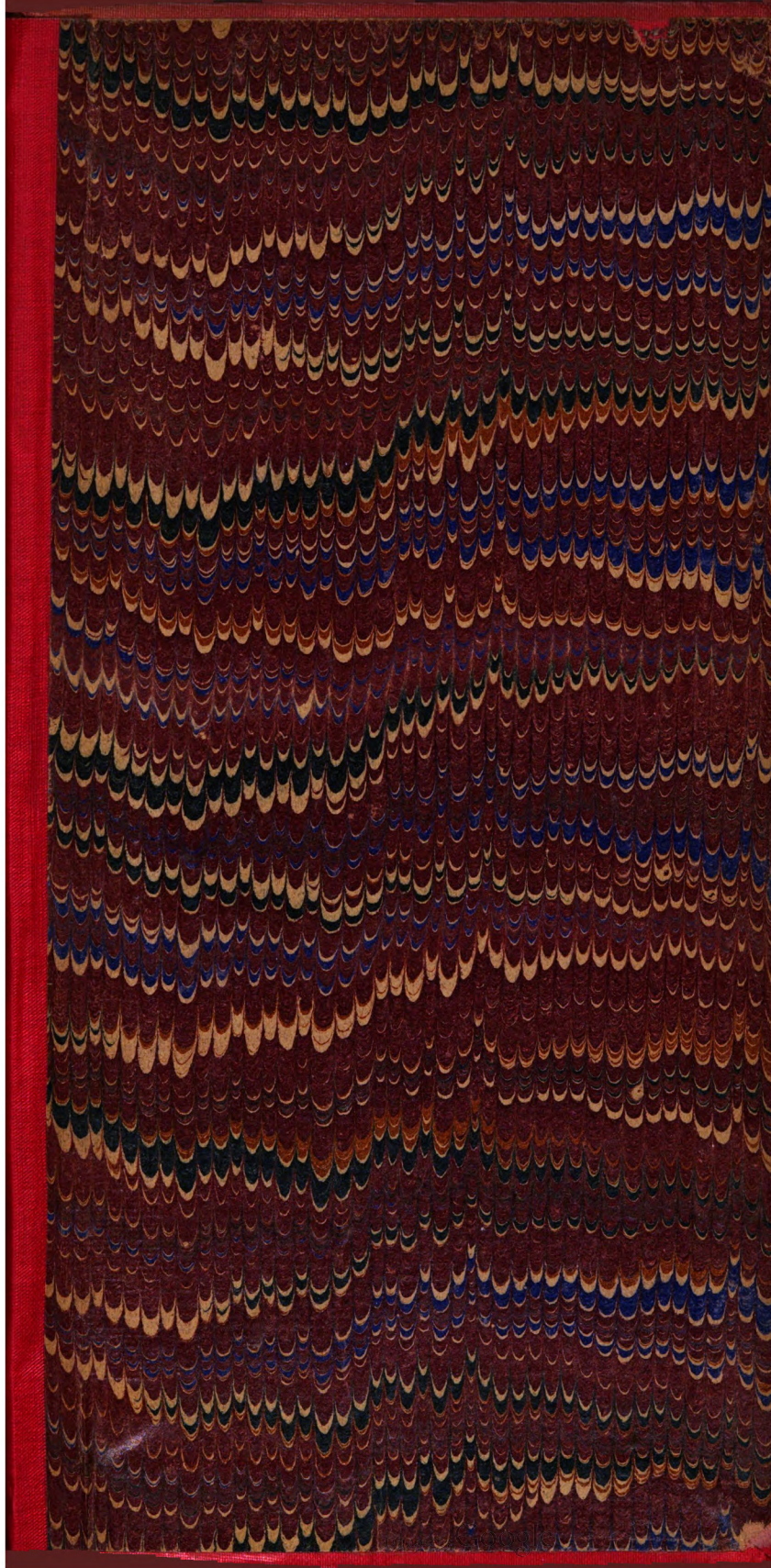
**BONANZA
OIL
CUP**



PARALLEL CLAMP.







UNIVERSITY OF ILLINOIS-URBANA



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